"It means that Taiwan, and especially the agricultural region around Tainan where the plain is broadest, suffers periodically from a too heavy rainfall and from dry periods.(3)

> 3. Not only seasonal distribution of precipitation is important, but also its distribution by days and even hours, and this distribution is extremely unequal in Taiwan. In Koshun maximum daily precipitation was 240 mm. and in Taichu 310 mm. (12 inches), or in one day (probably in one or two hours) more than in the four months of September-December. This leads, of course, to flood conditions and extensive damage.

For cultivation to be successful in these conditions necessitates, on the one hand, special arrangements for the prevention of floods and for drainage and, on the other, for irrigation. Only with the help of irrigation can the rich soils of Taiwan give maximum returns. One cannot say that the Chinese neglected irrigation before the coming of Japanese administration. However, they were ignorant of efficient Western methods of controlling the rivers, and in many cases only these methods, applied by Japanese specialists, could give good results."

4:Grajdanzev--24 S-4 (no date) 1942 Formosans
116, 162, 311

"As may be seen from the following figures, the population of Taiwan is very unequally distributed:

Province	Area (sq. km.)	Population (thousands)	Density per sq. km.
Taihoku (N.)	4,594	1,101	240
Sinchiku (N. W.)	4,570	766	167
Taichu (W. center)	7,382	1,251	170
Tainan (W.)	5,421	1,422	262
Takao (S. W.)	5,721	795	139
Taito (S. E.)	3,515	77	22
Karenko (E.)	4,628	124	27
Pescadores	126	68	539
Japan proper (1938)	379,000	72,223	191

Two eastern provinces are comparatively thinly populated, while Taihoku and Tainan have a density greater than the average for Japan. However, the actual distribution is even more unequal than these figures suggest. for almost every province consists of two parts—a coastal plain which is extremely densely populated, and the hilly and the mountainous hinterland where the density is very low. This is not to say that the latter is incapable of development; indeed the development of these areas is one of the greatest problems confronting the government."

4:Grajdanzev--28 S-4 (no date) 1942 Formosans
116, 167, 311, 609, 177.16 Japan
636.16

"It should be noted that, even after the pacification of the island, Japanese immigrants were treated in a hostile manner by the Chinese population. Under this pressure many farmers were compelled to leave their villages, some of them renting their land to Chinese and becoming absentee landowners. The total number of Japanese occupied in agriculture in Taiwan in 1938 (including members of their families) was 8,065.

The colonization schemes for fishermen were not much more successful. In 1909 the government-general began its campaign, promising subsidies and other advantages. But those who answered the call preferred some occupation in Taiwan other than that of fishermen. In 1926 in Taihoku province 49 families (172 persons) were settled and most of them continue to work there. Since 1932, the government has again made efforts to attract fishermen to Taito province, and, up to 1937, 54 families had settled there. The plan for 1938 and 1939 foresaw the settlement of 25 families for each year. Such are the very modest results of the continuous efforts of the Japanese government.

Takahashi is of the opinion (1) (and his opinion reflects the ideas prevailing among

1. See his Gendai Taiwan Keizairon, pp. 8-9.

Japanese economists) that there is little room for the Japanese in Taiwan as long as the island remains an agricultural region; hence his belief that Taiwan should be industrialized."

4:Grajdanzev--41-42 S-4 (no date) 1942 Formosans-1-3
116, 241, 311

"We begin our investigation of Taiwan's economy with agriculture because the majority of the population are occupied in this field. First, let us examine the area under cultivation. In considering the figures given below, one should bear in mind the following fact: in Taiwan, as in other southern regions, in many cases two and even three crops a year are taken from the same field, and thus a distinction should be made between cultivated area and crop area. If each field produced two crops a year, then the total crop area would be double that of the cultivated area. Double cropping usually takes place on irrigated fields, although, if rainfall is evenly distributed from month to month, even dry fields can yield two crops. The growth of total cultivated area of Taiwan and of its irrigated area is shown in the following table: [42]

Cultivated Area Of Taiwan
(1,000 ko) (1)

1. Ko (in mandarin Chinese chia) is a local measure of area equal to 2.377 acres or 0.961 hectare.

Cultivated Area Of Taiwan [Cont.]

	Paddy fields producing one crop	Paddy fields producing two crops	Total paddy fields	Dry fields	Total
1900	...	...	200.7	157.5	358.2
1904	...	...	312.6	332.1	644.7
1909	...	...	337.8	344.7	682.5
1911	...	...	346.4	364.9	711.3
1916	...	...	358.8	379.7	738.4
1923	261.5	115.3	376.8	398.6	775.4
1933	313.1	147.4	450.5	395.0	845.5
1934	320.0	142.9	462.9	388.4	851.3
1935	322.2	141.3	463.5	363.2	856.8
1936	327.4	206.4	533.8	338.4	872.3
1937	332.3	212.1	544.4	338.8	883.3
1938	331.8	211.4	543.2	341.2	884.4

Source: for 1900. Nogyo nenkan, 1937; for 1938, Taiwan Jijo, p. 456.

The population of Taiwan is growing rapidly, and its agricultural population is very large. Under these conditions an increase of area under cultivation should be recognized as significant, and if the figures given above are correct, the cultivated area increased

2.47 times in thirty-eight years—a remarkable advance. But if we examine the figures, we find that between 1900 and 1909 the cultivated area increased from 358,200 ko to 682.500 ko, or by 36,033 ko every year, while between 1909 and 1938 the increase was from 682,500 ko to 884.000 ko, or only 6,940 ko every year. The greatest expansion therefore took place when the government did not even have complete control of the island, and only in 1908 did the administration work out a comprehensive scheme of irrigation. The explanation of this striking initial increase would appear to be that between 1900 and 1909 the Japanese government made a complete survey of Taiwan, and many lands were recorded which formerly did not appear in the official figures."

"(1) A special investigation made by a government committee in 1923 estimated the cultivable area in Taiwan at 940,000 ko (900,300 hectares or 2,234,000 acres); another committee in 1929 estimated this area at 930,000 ko (893,700 hectares). (1) The area

1. Quoted by Takahashi, op. cit., p. 94.

cultivated at present is about 850,000 hectares or 23.8 per cent of the total area of the island, which is 3,576,000 hectares. If the estimates of the committees are [44] correct, then the cultivated area of Taiwan is approaching its maximum and only about 40,000 to 50,000 hectares remain to be turned into fields. We do not know what criteria the committees used in their investigations, but there are reasons to believe that their estimates are too low. Almost half of the total area of the island is territory of the aborigines, where fields are almost non-existent. It is true that this territory is mountainous and the cultivable area cannot be great, yet it should be considerably greater than 40,000 to 50,000 hectares. However, it is clear that the greater portion of cultivable land is already under the plough, so that the emphasis should be placed on other methods of increasing agricultural output.

This disparity between the growth of population and the growth of cultivated area has brought a sharp increase in land values. In 1914 one ko of good paddy land in the central

part of Taiwan province cost on the average ¥331; in 1925, ¥700; in 1937, ¥2,000. (2)

2. Ibid., p. 158.

Of course, the depreciation of the yen, the increase of yields and other factors also played a part in this increase, but the pressure of increasing population was probably also an important element."

4: Grajdanzev--44-45 S-4 (no date) 1942 Formosans
116, 241, 311

"(2) Irrigation combined with double cropping is another [45] way of increasing agricultural production. In 1937 one ko of dry field produced on the average eight koku of rice, while one ko of paddy yielded 14.9 koku in one crop or, where two crops were possible, 28.1 koku. (1) Irrigation almost doubles the crop while irrigation and double cropping

1. Figures are taken from Nogyo nenkan, 1939-40, pp. 647-648.

combined increase the yield three and a half times.

Data on the increase of irrigated area and of double-crop area were given in the preceding table. [See p. 42, category 116--analyst] Here we may point out that while in 1909 only 49.5 per cent of the total cultivated land was in paddy fields, in 1937 paddy fields accounted for 61.6 per cent of the total and, according to the same table, 37.6 per cent of the total cultivated area was yielding two crops. If this is true, then the crop area should equal 137.6 per cent of the cultivated area but in the official sources for 1937 the total area of all crops amounts to only 1,120,400 ko or 127 per cent of the cultivated area. A possible explanation of this divergence is that ten per cent of the area was fallow or growing green manure, but this is hardly probable."

4:Grajdanzev--48 [31 S-4 (no date) 1942 Formosans
116. 241, 311

"Let us now see what part the same crops occupy in the sown area of Taiwan and compare this data with gross value of production."

4:Grajdanzev--52 S-4 (no date) 1942 Formosans
116, 243, 311

"Below we give the data on rice production since 1905. Area under rice

(1,000 ko)	1905	1915	1920	1925	1930	1935	1936	1937	1938	1939
Paddy	417	462	471	526	592	657	662	640	617	...
Dry field	44	44	45	42	41	42	41	38	28	..
Total	461	506	516	568	633	700	703	678	645	646
Yield per ko (koku)										
Paddy	9.7	9.8	9.7	11.7	11.8	13.3	13.9	14.0	15.5	
Dry field	7.7	6.4	6.1	6.9	8.8	8.7	8.4	7.7	7.8	14.2*
Crop (1,000 koku)										
Paddy	4,016	4,503	4,567	6,154	7,010	8,759	9,213	8,937	9,599	...
Dry field	338	281	276	289	361	364	345	295	218	...
Total	4,354	4,784	4,843	6,443	7,371	9,123	9,558	9,232	9,817	9,152
Price (yen per koku)	6.6	7.8	22.5	25.2	14.6	21.6	22.4	22.6	24.2†	25.6†

* Average for both paddy and dry field.

† Approximate figures."

4:Grajdanzev--52-53 S-4 (no date) 1942 Formosans
116, 243, 311, 656, 177.24 Japan
636.24

"Thus from 1905 to 1920 the area under rice expanded slowly and the yield per ko showed no increase, while from 1920 to 1935 the area under rice increased by thirty-seven per cent and the yield per ko of paddy increased also by thirty-seven per cent. The explanation of this difference does not lie in Taiwan, but in Japan proper. After 1920 the leaders of the Japanese government became worried over the rice supply of the Empire. The rapid growth of population and the insufficiency of domestic production brought a sharp increase of rice imports from abroad. From the annual average of ¥16.6 million in 1913-17 Japan's imports of rice rose to an annual average of ¥72.0 million in the period 1918-22.

Besides the difficulty of balancing payments abroad, the government did not like this dependence on foreign supplies in time of war. A program for the increase of rice production in Japan proper, Korea and Taiwan was worked out and the necessary measures applied, such as the construction of dams and canals for irrigation purposes, the enlargement of the net-[53] work of agricultural experimental stations, the distribution of small subsidies to new producers of rice as well as to those who would produce new varieties of rice selected by the stations. The fact that these measures were quite effective shows not only the efficiency of the administration but also the ability of the Chinese farmers to act in response to economic factors."

4:Grajdanzev--59-60 S-4 (no date) 1942 Formosans-1-3
116, 249, 311

"The area under sugar cane, the cane crop, and yield per ko were increasing in Taiwan as follows:

	Area (ko)	Cane crop (in million kin or 600 metric tons)	Yield per ko (in 1,000 kin or 600 kg)
1905-06	35,158	1,690.2	48.1
1908-09	39,035	2,219.5	56.9
1914-15	85,150	3,933.8	46.2
1917-18	150,450	6,817.5	45.3
1919-20	108,376	4,382.5	40.4
1920-21	142,032	6,752.8	47.5
1921-22	123,233	7,793.7	63.2
1926-27	101,531	7,412.0	73.0
1927-28	108,318	9,697.6	89.5
1928-29	120,046	12,291.9	102.4
1929-30	109,397	11,618.4	106.2
1930-31	99,094	10,944.7	110.4
1931-32	109,496	13,415.2	122.5
1932-33	83,690	8,782.0	104.8
1933-34	91,163	8,883.8	97.4

	Area (ko)	Cane crop (in million kin or 600 metric tons)	Yield per ko (in 1,000 kin or 600 kg)
1934-35	121,628	13,477.3	110.8
1935-36	128,329	13,190.4	102.8
1936-37	124,555	14,271.9	114.6
1937-38	134,208	15,101.1	112.5
1938-39	149,834*	19,602.1*	130.8

* There are reasons for questioning the data for 1938-39. If they are accurate, the acute shortage of sugar in Japan in 1939-40 is hard to explain. Japanese official figures for the rice crop in 1939 were also extraordinarily optimistic in spite of drought, but it is hard to understand why it was necessary to import rice hurriedly from foreign countries, wasting scarce foreign exchange if there was such an abundance of rice at home. The story is the same with sugar. Why was it necessary to introduce sugar ration cards cutting the average per capita consumption in half, if there was a tremendous increase in production? The estimates for 1940 reveal a sharp fall.

In 33 years the area under sugar cane increased almost four times, total production twelve times, and the yield per ko 2.7 times.

In 1939 the Japanese Empire occupied seventh place (1) among [60] producers of sugar

1. Others in order of importance were Cuba, India, U.S.S.R., Germany, U.S.A., Java.

and fourth place among producers of cane sugar. The Japanese sugar industry became a factor of world importance. It is true that Japan exports very little sugar, but her absence from the world market as a purchaser is of considerable importance."

4:Grajdanzev--71 S-4 (no date) 1942 Formosans
116, 171, 241, 311, 433, 511, 177.24 Japan
636.24

"It is worth while to observe that in our investigation of agricultural production in Taiwan the figures analyzed were averages, and no question was raised as to whether these averages may be considered representative. The one-sided development of agriculture was emphasized, especially the cultivation of rice and, to a lesser extent, of sugar cane. It is known that one-sided development of agriculture results in soil exhaustion unless sufficient quantities of fertilizers are used, but it was shown that the application of fertilizers is practised on a much smaller scale than in Japan. It was shown also that cultivation is on a low level, yields are low, technique is backward, the draft animal supply is insufficient and per capita consumption of cereals is considerably lower than in Japan.

The expansion of rice production which took place was due chiefly to the increase of the irrigated area and to the increase of acreage from which two crops can be obtained —largely through irrigation and improvement of fields. In the production of sugar cane considerable success has been achieved in increasing the yield and sugar content of the cane. However, in the production of both rice and sugar cane the farmers received a disproportionately small share of the gains."

4:Grajdanzev--75-76 S-4 (no date) 1942 Formosans
116, 311, 421, 427, 565

"Let us now turn to the investigation of the problem of tenancy. Its economic importance lies in the fact that (1) a large portion of the farmer's income is paid out for rent on land, and (2) the farmer is less interested in preserving the fertility of the land and in making improvements, because the land does not belong to him and may be taken from him at or even before the expiry of the lease. From the social point of view the phenomenon of tenancy is important in that it often creates an idle class of landlords or rich farmer-owners and a class of poverty-stricken tenants. The widespread existence of tenancy makes average figures for the agricultural population meaningless because on the extreme there are rich landlords and on the other poor tenants. In order to be able to judge more or less correctly the importance of tenancy we should know: (1) the number of farmer-owners, part-owners (i.e. those who own some land, but are compelled to rent additional acreage), and tenants; (2) the area which is farmed and the amount owned of that farmed by each of these groups; (3) the division of each of these groups into at least three [76] sub-groups—large, medium, and small—in order to see whether each of these groups is uniform since, for example, the tenant who rents one ko and the tenant who rents 50 ko belong to quite different groups; (4) the conditions of the rent. The available statistics for Taiwan throw light on but few of these elements."

"The figures given above refer to landownership. But the owners of small plots may increase their holdings by renting land. Some economists see the chief advantage of tenancy in the fact that it permits a capable farmer to get as much land as he is able to utilize. We give above the statistics of the size of the farms as actually operated in 1930 [See p. 79, category 116--analyst].

The picture is about the same as that of ownership. More than 30 per cent of the farmers till on the average less than 0.5 ko each (0.62 acres); 53 per cent till on the average less than one ko (less than 1.71 acre) and 77 per cent of the farmers till less than 2 ko (less than 3.39 acres). But 4.5 per cent tilled 30 per cent of the total area, while 579 farmers (or corporations) tilled 66,410 ko. There are therefore a considerable number of very large plantations in Taiwan, chiefly of sugar cane, bananas, pineapples, and tea. These are figures for 1930 and it is quite possible that even then the investigation did not cover all farmers. (1)

1. An indirect proof of this is that a similar investigation made in 1932 covered 340,000 farming families as compared with 405,000 in 1930.

Since 1930 the plantation area has increased sharply, so that the picture should be by now even less favorable. We have no statistics of land ownership by nationalities, but it is well known that all, or almost all, plantations belong to big Japanese companies.

However, it is clear that among Chinese farmers too, there is a sharp division in respect to landownership—there are wealthy Chinese owners, who though few in number, are very important by virtue of the power they wield."

6: Kirchhoff--34 [5] U-4 (no date) 1895 Formosans-1-2
116, 133, 311, 361

The more important localities in Formosa all arose as centers of the export trade, and are thus either harbors or at least are situated close to the coast.

The most remarkable degree of development has been attained by Tai-nan, formerly known as Tai-uan or Tai-uan-fu. It now lies more than 3 km. distant from the coast and away from the right bank of the Na-mu-ki. But as late as the 17th century the wide plain between the town and the sea, which is now traversed by creeks and in which there are many fishponds, was a stretch of the sea, and today it is still flooded every year by the southwest monsoon. At the place where nowadays the creek flowing westwards from the town widens out to form a broader stream, more resembling a river, there lies the rather higher ground that bears the village of An-ping, 2 1/2 km. from the town and close to the shore of this creek, which continues on in a southwesterly direction for another kilometer, offering anchorage to junks of shallow draught and finally joining the sea after traversing a shifting sandbank. This hilly ground on which is An-ping measures 1 km. from east to west and 1/2 km. from north to south; it still rises like an island amidst river arms and swampy plains, and is the already mentioned former coastal island of Tai-uan, its name then being given by the Chinese to the whole island of Formosa. At that time, when from 1630 to 1633, the Dutch built their fort of Zelandia, the longitudinal axis of the sandy islet (it was narrower also in those days) ran from southeast to northwest, forming the partial barrier against the open sea of a lagoon bay cutting more deeply into the body of the main island; in the north the entry

to the lagoon was always open, via a broader channel of the sea, and in the south a sandbank one could walk on at low tide already began to connect the isle to the main island.

6: Kirchhoff--36-37 U-4 (no date) 1895 Formosans
116, 311, 361, 487

To the northwest of Ki-lung the coastal village of Kimpaôli is of some significance because of the neighborhood of the solfataras of the Ta-tun Range. A road runs in a southwesterly direction from Kimpaôli and joins the so-called military road beginning opposite the harbor of Tam-sui, at the village of Pa-li-hun, and leading to Tai-nan and even farther along the coast to the southern point of the island.

In North Formosa the open place of Tiong-lek is situated on it, with heavy plantings of [37] rice, sweet potatoes, and turnips, and also the walled town of Teuk-tscham (now officially known as Sin-tschu). This is an important commercial center connected by water the nearby coast. Wide rice fields and luxuriant tea plantations surround it, but unfortunately it is not available for foreign trade, although an excellent market would be found here for materials and opium. Now loads of camphor are transported from here on the backs of bearers to Tam-sui, the nearest treaty port.

6. Kirchhoff--37 [2] U-4 (no date) 1895 Formosans
116, 175, 311, 361

Chinese settlement on the east coast is quite new, and so are the roads laid down on this coast and to the coast. Since the beginning of the 19th century Chinese settlers, for the most part people who had to expect punishment for some offense if they stopped longer in the region controlled by the Chinese Government, went round the northeast point of Formosa to the coastal plain of Kapsulan, now officially called Komalan. This plain is at most 10 to 12 km. broad. The fertility of this plain for crops of rice was soon recognized; so settlers came also who had not taken to flight, and here too, although in a hard struggle with the natives, Chinese villages gradually grew up, as far as the bay of Su-aô in the south. The favorable position of the little village of Su-aô (i.e., Su Bay), on this fine bay, was first recognized during the Japanese expedition of 1874, when it became the headquarters of the commander of the Chinese observation corps. Today Su-aô is a thriving town at the mouth of the river of the same name, whose valley forms a route for several kilometers to the southwest, towards the foot of the coastal range; all around are green rice fields, and the tea plant does well on the cleared forest soil of the surrounding heights.

"LAND UTILIZATION IN FORMOSA*

* Owing to limitations of space, the text of this article has been considerably condensed from the author's original manuscript, and several tables have been omitted. Also, the difficulties of time and distance have prevented the author from seeing galley proof. --Edit. Note.

Cheng-Siang Chen

Land utilization in Formosa is severely handicapped by the topography. Forest-covered mountains rising to impressive heights form a central range, which extends like a backbone the entire length of the island. Only 36 per cent of the land is utilized, and only 24 per cent of this is cultivated.

According to the comparatively reliable statistics of 1947, the total area of utilized land is 1,290,132 hectares, of which 66 per cent is cultivated (paddy fields, 41 per cent; dry fields, 25 per cent). Considerable changes have occurred during the last 20 years or so Table 1 (1). The percentage of paddy fields has increased, and that of dry fields

1. All tables are based on data contained in the Taiwan

Agricultural Yearbook, Dept. of Agriculture and Forestry, Taipei.

has decreased, as a result of the development of irrigation and drainage. The progress of economic forestation is reflected in an increase of the forested land; the growing popularity of cremation has reduced the burial ground. Land in railroads and highways has also increased, because of the expansion and development of communications."

8: Chen--438 [2] N-3 (no date) 1951 Formosans
116, 311

TABLE I—LAND CLASSIFICATION IN FORMOSA
(*In hectares*)

CLASSIFICATION	1920 AREA	1920 %	1930 AREA	1930 %	1940 AREA	1940 %	1947 AREA	1947 %
Paddy fields	354,885	34.7	392,176	31.8	527,192	41.5	524,253	40.6
Dry fields	353,581	34.5	388,083	31.5	316,030	24.9	318,985	24.7
Forested	121,408	11.9	268,424	21.8	273,776	21.6	260,748	20.2
Prairie	97,744	9.5	71,665	5.8	36,423	2.9	59,308	4.6
Building sites	34,521	3.4	36,674	3.0	41,496	3.3	43,325	3.4
Irrigation ditches	....	...	13,229	1.1	15,824	1.2	16,685	1.3
Irrigation ponds	13,838	1.4	13,003	1.0	12,073	0.9	12,167	0.9
Burial ground	15,575	1.5	12,819	1.0	11,624	0.9	11,371	0.9
Railroads and highways	....	...	2,710	0.2	9,349	0.7	10,688	0.8
Piscicultural ponds	24,710	2.4	21,558	1.7	11,820	0.9	10,431	0.8
Salt fields	1,385	0.1	2,054	0.2	4,878	0.4	7,191	0.6
Pasture	3,567	0.3	5,020	0.4	2,267	0.2	764	0.1
Temple sites	484	0.1	511	0.1	626	0.1	677	0.1
Miscellaneous	2,439	0.2	4,596	0.4	6,693	0.5	13,629	1.0
Total	1,024,137	100.0	1,232,522	100.0	1,270,077	100.0	1,290,132	100.0

8: Chen--439 N-3 (no date) 1951 Formosans
116, 133, 311

"The distribution of land use (exclusive of cultivated land) among the hsiens [EJ: i. e. the administrative districts of Formosa] is an index to their geographic characteristics. For example, 56 per cent of the irrigation ditches of the island are in Tainan, a percentage obviously related to the great Kianan irrigation system; and 70 per cent of the irrigation ponds are in Hsinchu, because the topography of the Taoyuan alluvial fan, in the northern part, makes it suitable for damming. Ninety-six per cent of the piscicultural ponds are in Tainan and Kaohsiung, because the waters off the southwest coast are shallow and there are many lagoons and narrow inlets that can be converted into piscicultural ponds; and 89 per cent of the salt fields are in Tainan, whose coastal plain, low, very dry, and with brilliant sunshine in winter, offers good natural conditions for saltmaking. And in Penghu hsien burial grounds occupy 10. 3 per cent of the utilized land, both because the Pescadores Islands are the earliest-developed and most densely populated area and because the meager land is unsuitable for cultivation (more than 60 per cent of the inhabitants are dependent on sea fisheries for sustenance).

8: Chen--439-441 N-3 (no date) 1951 Formosans--1-3
116, 311

"CULTIVATED LAND

Formosa's 35,961 square kilometers may be divided into level land (administrative regions) and hilly land (aboriginal regions). The total area of level land is about 19,800 square kilometers; its index of cultivation (2) is [440] 43 per cent. The total area of

> 2. The 'index of cultivation' is the percentage of cultivated land in the total land area. The total land area of Formosa, including Penghu and other islands, is 3,596,100 hectares; the total area of cultivated land (10-year average, 1936 to 1945) is 846,552 hectares. Hence the index of cultivation is 23.5 per cent, which is higher than that for South China, Japan, or Korea.

hilly land is about 16,100 square kilometers; its index of cultivation is only 2 per cent. Ninety-four per cent of the cultivated land lies in the coastal plains of the five western hsiens; Hwalien, Taitung, and Penghu together contain only 6 per cent (Table II). The extensive mountainous interior is covered with forests, in which there is little farmland.

The amount of cultivated land increased rapidly from 674,100 hectares in 1910 (Table III)

to 860,439 hectares in 1940. But after 1940 there was a gradual slowing down followed by another increase, and the index of cultivation seems now to be approaching saturation. Among the hsiens, the index for Penghu is highest, 58 per cent; that for Hwalien and Taitung is lowest, only 5-6 per cent (Table II).

The cultivated land may be roughly classified into paddy fields and dry fields. In 1910 paddy fields occupied about 49 per cent of the total cultivated land, dry fields 51 per cent. In 1948, as a result of the spread of irrigation and [441] the consequent change of dry fields into paddy fields, the corresponding percentages were 61 and 39 (Table III).

The price of paddy fields differs greatly from that of dry fields, because of the difference in productivity. From 1938 to 1942 the average price of paddy fields was 3615 yen per hectare; that of dry fields, only 1748 yen. The price of both paddy and dry fields was higher in the five western hsiens than in the two eastern hsiens: respectively 3639 yen and 1815 yen per hectare in the west; 2996 yen and only 917 yen in the east. According to the 'Survey on Farm Rent Economy' published in 1937 by the Formosa government, the average rent for paddy fields is about 48 per cent of the value of the products; that for dry fields is 33 per cent."

8: Chen--439-441
116, 311

N-3

(no date) 1951

Formosans-3

TABLE II—CULTIVATED LAND BY HSIENS, 1940 AND 1948

HSIEN	1940			1948		
	CULTIVATED LAND		INDEX OF CULTIVATION	CULTIVATED LAND		INDEX OF CULTIVATION
	Hectares	%	%	*Hectares*	%	%
Taipei	93,657	10.88	20.39	90,389	10.47	19.68
Hsinchu	148,410	17.25	32.47	150,574	17.45	32.95
Taichung	172,058	20.00	23.30	175,511	20.33	23.77
Tainan	267,779	31.12	49.34	261,052	30.25	48.15
Kaohsiung	127,342	14.80	22.25	131,976	15.29	23.06
Taitung	17,376	2.02	4.94	20,701	2.40	5.89
Hwalien	26,803	3.12	5.79	25,582	2.96	5.53
Penghu	7,014	0.83	55.29	7,371	0.85	58.04
Province	860,439	100.00	23.93	863,156	100.00	24.00

TABLE III—CULTIVATED LAND AND INDEX OF CULTIVATION

YEAR	CULTIVATED LAND	INCREASE INDEX	INDEX OF CULTIVATION	PADDY FIELDS		DRY FIELDS	
	Hectares		%	*Hectares*	%	*Hectares*	%
1900	347,408	100	9.7	194,656	56.0	152,752	44.0
1905	624,501[a]	180	17.4	304,908	48.8	319,593	51.2
1910	674,100	194	18.7	332,372	49.3	341,728	50.7
1915	700,080	202	19.5	343,087	49.0	356,993	51.0
1920	749,419	216	20.8	367,177	49.0	382,242	51.0
1925	775,468	223	21.6	373,629	48.2	401,839	51.8
1930	812,116	234	22.6	396,670	48.8	415,446	51.2
1935	831,003	239	23.1	478,689	57.6	352,314	42.4
1940	860,439	248	23.9	529,610	61.6	330,829	38.4
1945	816,016	235	22.7	504,709	61.9	311,307	38.1
1948	863,156	248	24.0	526,391	61.0	336,765	39.0

[a] The sudden increase from 1900 to 1905 resulted chiefly from the discovery of unregistered land by the official survey.

8: Chen--441 [2] N-3 (no date) 1951 Formosans
116, 162, 241, 311, 511

"SIZE OF FARMS

The agricultural population of Formosa is constantly increasing, though the percentage has fallen a little. But the area of cultivated land cannot be extended; consequently, the farms are generally very small, as in the provinces of China proper; moreover, the inheritance system breaks up the farms and further reduces the average size. From 1936 to 1945 the total area of cultivated land in Formosa averaged 846, 552 hectares, the number of farm families 448, 474; thus each farm family had only 1. 89 hectares of cultivated land. Although this seems larger than the average farm on the mainland of China, Formosan farm families average 6. 7 persons, as compared with 5. 4 persons on the mainland.

In 1939 more than 85 per cent of the farm families had less than the three hectares estimated necessary to maintain a comparatively reasonable standard of living (Table IV); and at present, because of the usurpations and annexations of the landlords, about 46 per cent operate farms of less than one hectare, of which 26 per cent are less than 0. 5 hectare. The poverty in rural districts and the hard life of farm families are plain. Those who operate farms of more than 10 hectares are less than 1 per cent of the total number of farm families."

8: Chen--442-443 N-3 (no date) 1951 Formosans--1-4
116, 241, 311

"MULTIPLE CROPPING AND KINDS OF CROPS

The climate of Formosa is warm and hot the year round; rainfall is abundant, the growing season long. Therefore most of the cultivated lands have two harvests a year. In other words, the crop area is much greater than the cultivated area. From 1938 to 1942 the area of cultivated land averaged 858, 355 hectares, the crop area 1, 364, 561 hectares; the multiple-crop index was 159 per cent. Among the hsiens, Taichung has the highest multiple-crop index (176 per cent), Hwalien the lowest (142 per cent).

Of all kinds of cultivated land, the double-cropped paddy fields have the highest multiple-crop index. These fields, which produce at least two harvests a year, occupy about 38 per cent of the total cultivated area. In addition, other crops are planted between the seasons or between the rows of paddy, so that there may be five harvests in two years or three harvests in one year. The multiple-crop index of double-cropped paddy fields approximates the average crop index of the lower Yangtze Valley. In view of the total area of cultivated land, Formosa has the highest multiple-crop index of the provinces of China. It is a compensation for the small size of the farms.

Temperatures permit the growing of many kinds of crops in all seasons, but it is mainly the uneven distribution and amount of the rains that set the agricultural season.

In the southern part of the island rainfall is concentrated in the summer; the winter is extremely dry. In places without irrigation, only one crop of paddy rice can grow, and the time for seeding and planting is fixed. In the northern part, though there is no dry season, the low temperatures and frequent rain in winter are not suitable for paddy rice, and there is a longer time for intermediate crops and fallow. The typhoon season and the length of day are also factors controlling the farming rhythm.

According to the Taiwan Agricultural Yearbook, more than 70 kinds of crops are grown in Formosa. However, three -- paddy rice, sugar cane, and sweet potato-- make up 70 per cent of the total value of agricultural products and occupy 72 per cent of the total crop area (Table V).

The crops may be divided into three kinds: food, cash, and horticultural. Among the food crops, paddy rice is first, sweet potato second. The chief cash crops are sugar cane and tea; tobacco and groundnuts come next. The horticultural crops include fruits and vegetables: banana is the most abundant fruit, with pineapple and citrus fruits next; among the vegetables, radish and mustard leaf are grown the most.

There is no obvious regional distribution of the food crops. For example, the area percentages of rice and sweet potatoes do not vary much among [443] the hsiens. (In Penghu, on account of the frequent gales, rice cannot be grown, and consequently the percentages of sweet potato and groundnuts are unusually high.) The distribution of cash

and horticultural crops is comparatively centralized. For example, in Taipei and Hsinchu the crop area of tea gardens exceeds 10 per cent of the total crop area of each hsien (average, 1937-1939); in the other hsiens tea gardens are insignificant or lacking. The total crop area of banana plantations in Taichung and Kaohsiung is 85 per cent, and that of pineapple plantations 83 per cent, of the provincial total. The sugar-cane fields of Tainan and Taichung together occupy about 69 per cent of the crop area of sugar cane of the whole province; the citrus orchards of Taipei and Hsinchu occupy 68 per cent of the crop area of orchards of the whole province. As vegetables are mostly consumed locally, their distribution is similar to that of food crops. Largely because of the widespread cultivation of paddy rice, green manure is grown in all the hsiens except Penghu, but in Taipei the interval between the two paddy crops is too short to permit cultivation of green manure, and its crop-area percentage is therefore unusually low."

8: Chen--442-443 N-3 (no date) 1951 Formosans-4
116, 241, 311

TABLE V—VALUE OF AGRICULTURAL PRODUCTS AND AREA OF THE CHIEF CROPS, 1936–1945*

CROP	VALUE (*in yen*)	% OF TOTAL VALUE	AREA (*in hectares*)	% OF TOTAL AREA
Paddy rice	272,153,000	47.09	620,560	46.31
Sugar cane	92,704,000	16.05	143,430	12.65
Sweet potato	40,260,000	6.90	142,768	12.59
Banana	12,932,000	2.23	18,003	1.59
Tea	11,581,000	2.00	42,004	3.70
Tobacco	7,082,000	1.22	3,330	0.29
Groundnuts	5,288,000	0.91	25,906	2.28
Pineapple	5,013,000	0.86	8,128	0.72
Radish	4,798,000	0.83	7,709	0.68
Citrus	4,583,000	0.79	4,881	0.43
Jute	2,606,000	0.45	11,167	0.98
Leaf mustard	2,044,000	0.35	3,178	0.28

* The total value of agricultural products includes the value of animal products, and the total crop hectare area includes green manure.

"ROTATION

Formosa enjoys the peculiar advantage of tropical and subtropical agriculture -- year-round rotation. The cycle of rotations for paddy fields ranges from one to four years, but one-year and two-year cycles are comparatively prevalent. The rotation cycle for dry fields is mostly limited to one or two years, except on sugar-cane plantations, where it runs into more than two years. [444]

The popular rotations and their cycles are as follows:

PADDY FIELDS

a) Paddy rice (Mar., Apr.-July)→Paddy rice (July, Aug.-Nov.)→ Green manure (Dec.-Mar.)

b) Paddy rice (Mar., Apr.-July)→Sweet potatoes (Aug., Sept.-Jan. and Feb.)

c) Paddy rice (Mar., Apr.-July)→Paddy rice (July, Aug.-Nov.)→Vegetables (Dec.-Jan., Feb.)

d) Paddy rice (Mar., Apr.-July)→ Paddy rice (July, Aug.-Nov.)→ Overlapping sugar cane (1) (Oct.-Jan., Feb.)→Green manure (May-Nov.)→Sugar cane (Dec.-

1. 'Overlapping sugar cane' is so called because the young

sugar cane is planted between rows of the second crop of paddy rice when it is nearly ripe.

Mar., 3rd year)

DRY FIELDS

a) Groundnuts (May-Sept.) → Sweet potatoes (Oct.-Mar.)
b) Upland rice (Apr.-Aug.) → Sweet potatoes (Sept.-Mar.)
c) Green manure (May-Nov.) → Sugar cane (Dec.-Mar., 3rd year)

Paddy rice is generally the first crop. The growing season is usually four months; that for the second paddy crop, about three months and a half. Between the two growing seasons there is a so-called 'summer intermediate crop' season of one to two months; between the second season of one year and the first season of the following year there is a so-called 'winter intermediate crop' season of three to four months. The distribution of these seasons through the year varies according to the region. The first paddy crop is planted and harvested much earlier in the south than in the north. The second paddy crop is also planted and harvested much earlier in the south, but the difference in time is not so great. Thus the summer intermediate crop season begins earlier in the south

and lasts longer, but the winter intermediate crop season, though it begins earlier, does not last as long as in the north, because the following first paddy crop is planted much earlier.

The summer intermediate crop season, because of its short length and overabundant rainfall, is suitable only for green manure and two or three kinds of vegetables. On the other hand, the longer duration and better weather of the winter intermediate crop season make possible the cultivation of many kinds of crops. The duration of the winter intermediate crop season and the intensity of land utilization increase progressively northward; however, north of Hsinchu city the winter intermediate crops are usually delayed by the rainy and chilly weather. As a matter of fact, the middle part of the island, in spite of its rather dry winter, is the best area for winter intermediate crops, because of the development of irrigation; that is why Taichung has the highest multiple-crop index.[445]

Sugar cane is the second crop of Formosa. Since autumn planting became popular, the space left by the young sugar-cane crop has been utilized for sweet potatoes, groundnuts, cotton, wheat, and vegetables. In the paddy fields of the middle part sugar cane and paddy rice are alternately grown. Thus all the cultivated area of the island is utilized to the utmost."

"INTENSITY OF LAND UTILIZATION

If compared with the agriculture of the Philippines and Siam, Formosan agriculture can be called 'intensive'; but in comparison with the agriculture of Japan, it is somewhat extensive. Moreover, rice is the staple crop of Formosa, and its chief production factors are manpower, fertilizer, animal labor, and implements.

To maintain the productivity of the land and increase crop yields, great quantities of fertilizer are needed. After the middle 1920's the use of fertilizer gradually increased—to 133 per cent of the 1924 amount in 1930, to 173 per cent in 1935, to 202 per cent in 1940, and to the peak of 410 per cent in 1943. From 1936 to 1945 the consumption of commercial fertilizer averaged 4,293,000 quintals a year, of which rice and sugar cane consumed the largest amounts (about 50 and 35 per cent respectively). But after the outbreak of the Second World War importation and use of fertilizer decreased, and consequently, fertilizer consumption and crop yield being closely related, the yield of rice and sugar cane also decreased.

Among the rice crops, the Ponlai rice, though its fertilizer and labor needs are greater than those of the native rice, is more commercial, and the method of cultivation is comparatively more progressive. But the intensity of Ponlai-rice cultivation is far

behind that of Japan, and only on the same level with that of Korea. For example, Formosa uses (1935) 34.6 per cent of the amount of natural fertilizer used in Japan, though it uses 119.3 per cent of commercial fertilizer; with respect to the cost per hectare, Formosa spends only 83 per cent as much as Japan. The number of manpower days per hectare is only 49.1 per cent of that in Japan, the amount of wages only 47.4 per cent. The number of animal-labor days per hectare is as much as 97.3 per cent of that in Japan, but the expenses for animal labor are only 57.1 per cent. The expenses for farm implements per hectare are only 28.7 per cent of Japan's. In short, the intensity of land utilization in Formosa is about 57.3 per cent of that in Japan and 95.4 per cent of that in Korea.

From 1931 to 1934 the cost of fertilizer used per hectare in Formosa averaged 51 yen a year; in Japan, 81 yen. However, Formosa's multiple-crop index is about 20 per cent higher than Japan's; consequently, the per [446-453 contain maps] [454] hectare cost of fertilizer must be reduced 20 per cent, to 40 yen--about half the cost in Japan. (Table VI).

The intensity of land utilization of a region is reflected in the unit-area production of the farmland. The intensity of land utilization in Formosa being lower than that in Japan, the average per hectare production of many crops is only 50 per cent of the Japanese production and approximates the average of the provinces of South China (Table VII)."

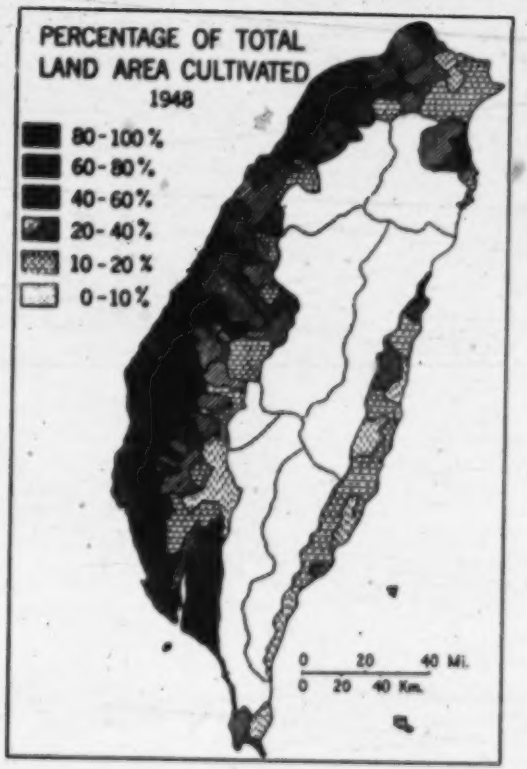

PERCENTAGE OF TOTAL
LAND AREA CULTIVATED
1948
80-100%
60-80%
40-60%
20-40%
10-20%
0-10%
0 20 40 Mi.
0 20 40 Km.

Fig. 6

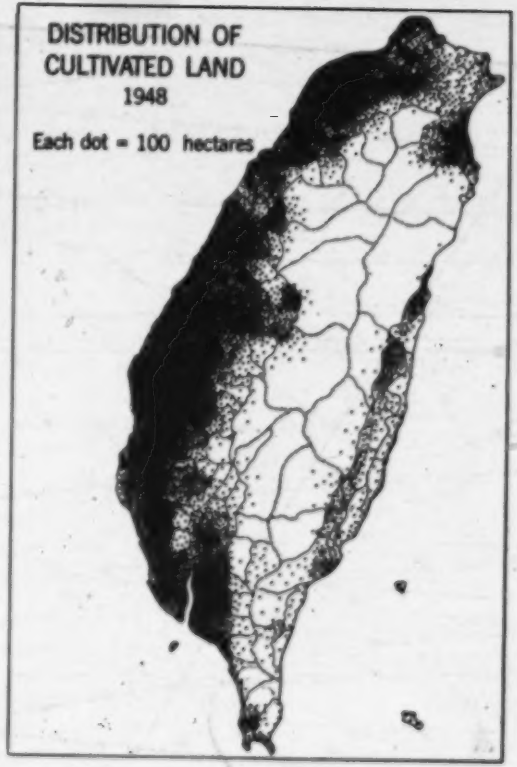
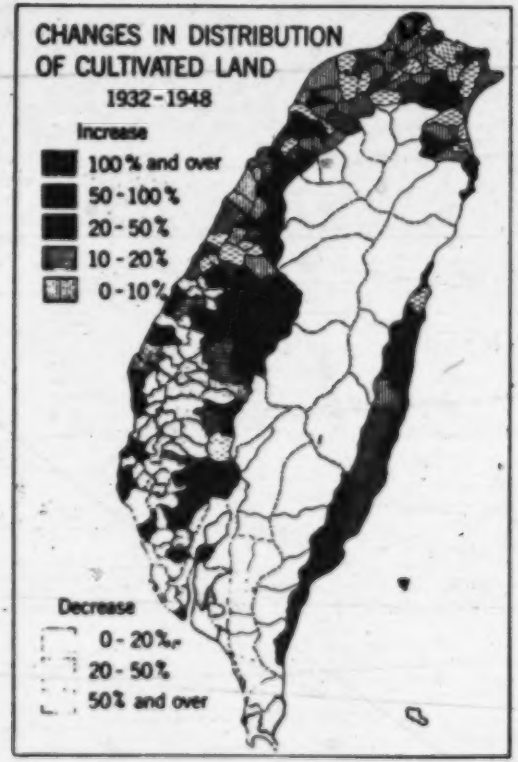

DISTRIBUTION OF
CULTIVATED LAND
1948
Each dot = 100 hectares

Fig. 7

8: Chen--447[2]
116, 241, 311

N-3 (no date) 1951

Formosans



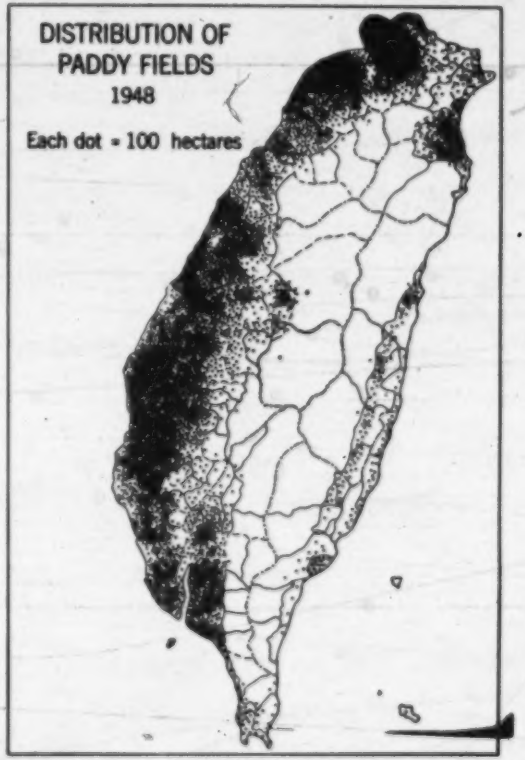


FIG. 8

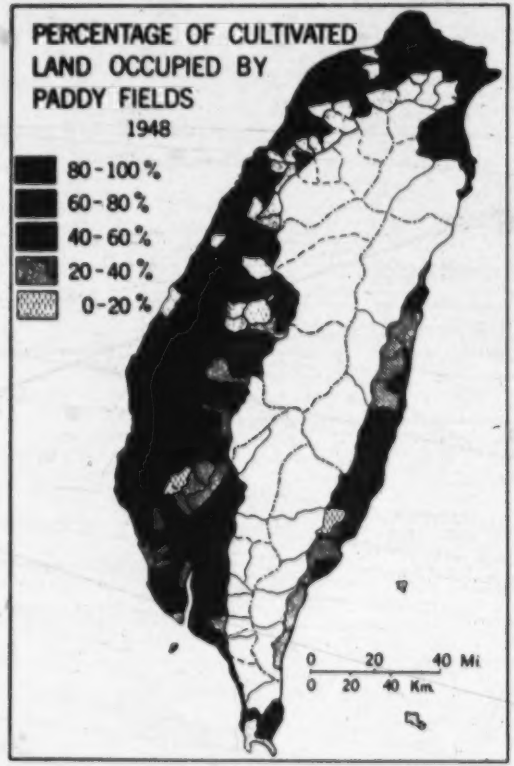

PERCENTAGE OF CULTIVATED LAND OCCUPIED BY PADDY FIELDS
1948
80-100%
60-80%
40-60%
20-40%
0-20%
0 20 40 Mi
0 20 40 Km

FIG. 10

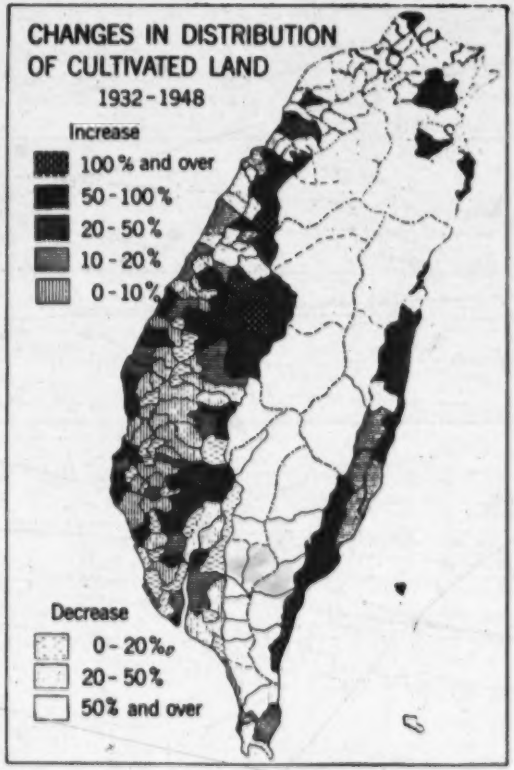

CHANGES IN DISTRIBUTION OF CULTIVATED LAND
1932-1948
Increase
100% and over
50-100%
20-50%
10-20%
0-10%
Decrease
0-20%
20-50%
50% and over

FIG. 11

8: Chen--448 [2]
116, 241, 311

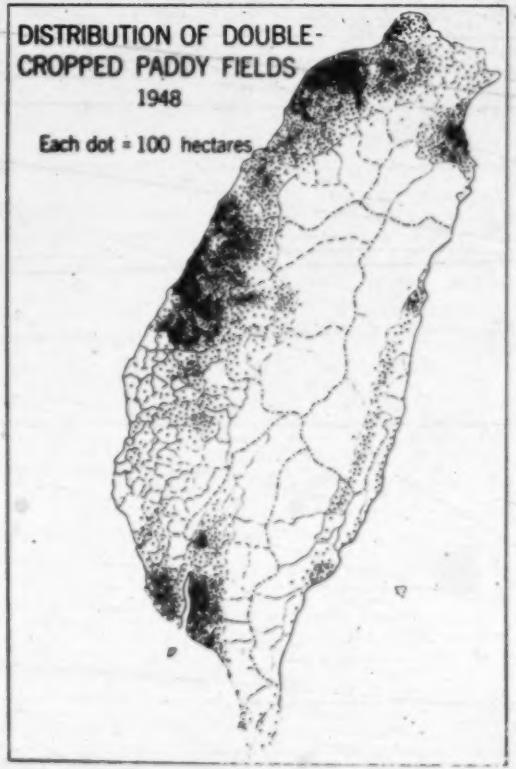


FIG. 12

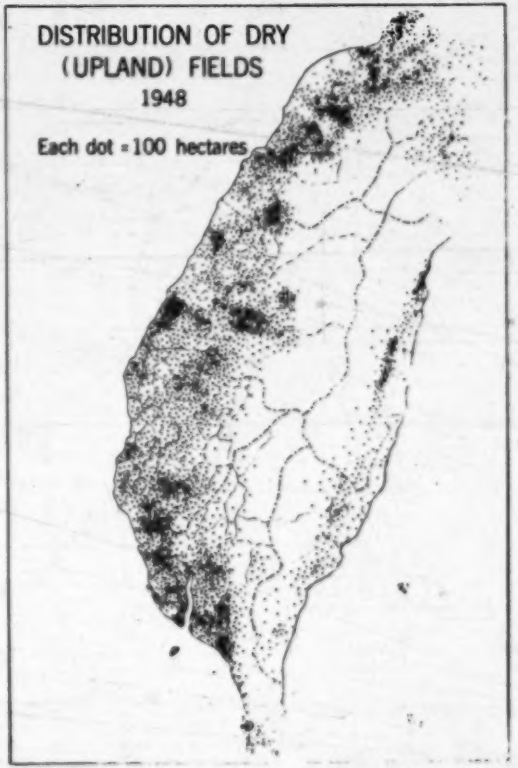


FIG. 11

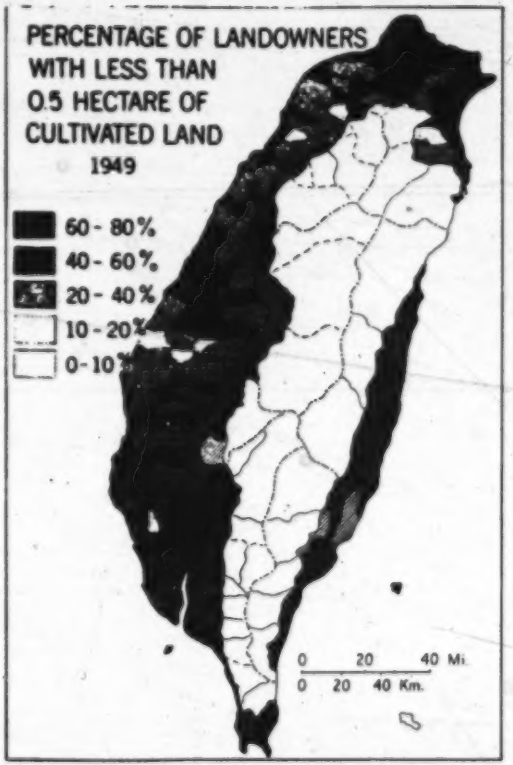

PERCENTAGE OF LANDOWNERS WITH LESS THAN 0.5 HECTARE OF CULTIVATED LAND
1949
60 - 80%
40 - 60%
20 - 40%
10 - 20%
0 - 10%
0 20 40 Mi.
0 20 40 Km.

Fig. 14

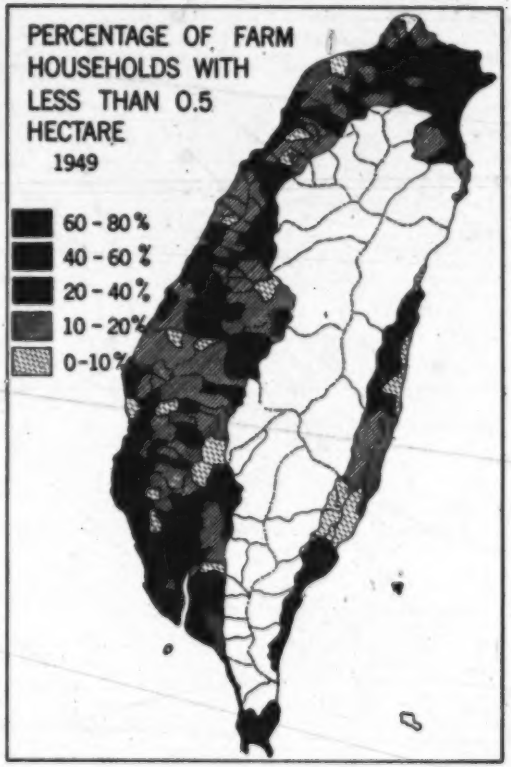

PERCENTAGE OF FARM HOUSEHOLDS WITH LESS THAN 0.5 HECTARE
1949
60 - 80%
40 - 60%
20 - 40%
10 - 20%
0 - 10%

Fig. 15

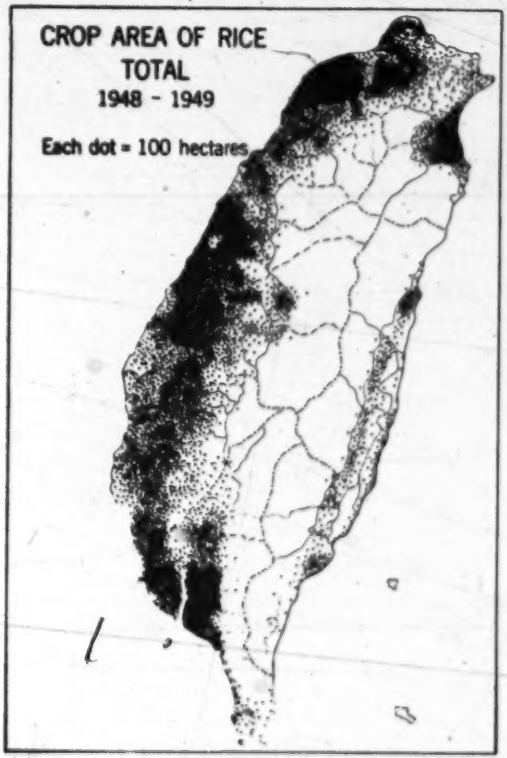

CROP AREA OF RICE
TOTAL
1948 - 1949
Each dot = 100 hectares

FIG. 16

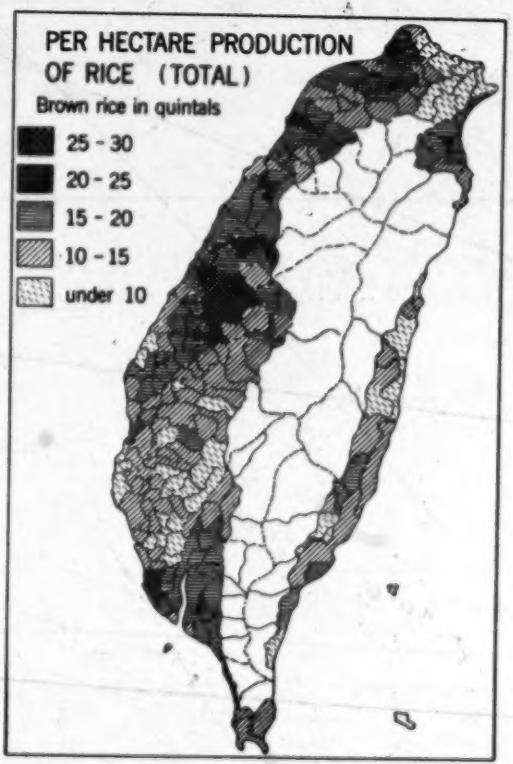

PER HECTARE PRODUCTION
OF RICE (TOTAL)
Brown rice in quintals
25 - 30
20 - 25
15 - 20
10 - 15
under 10

FIG. 17

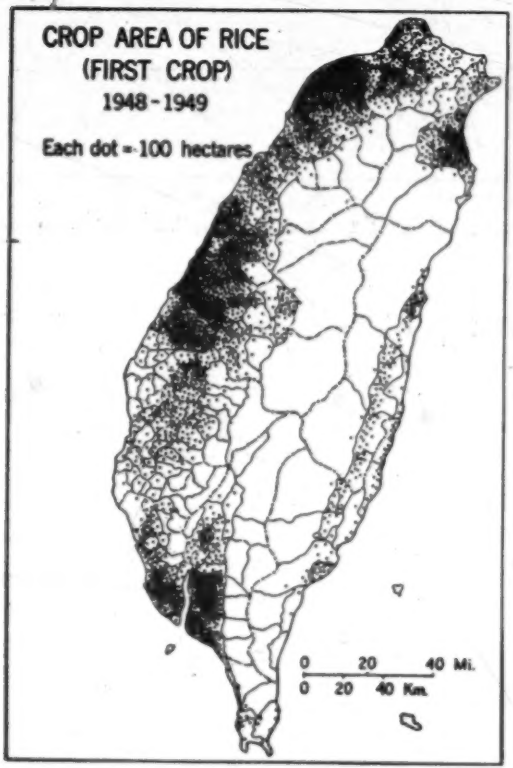

CROP AREA OF RICE
(FIRST CROP)
1948-1949
Each dot = 100 hectares
0 20 40 Mi.
0 20 40 Km.

FIG. 18

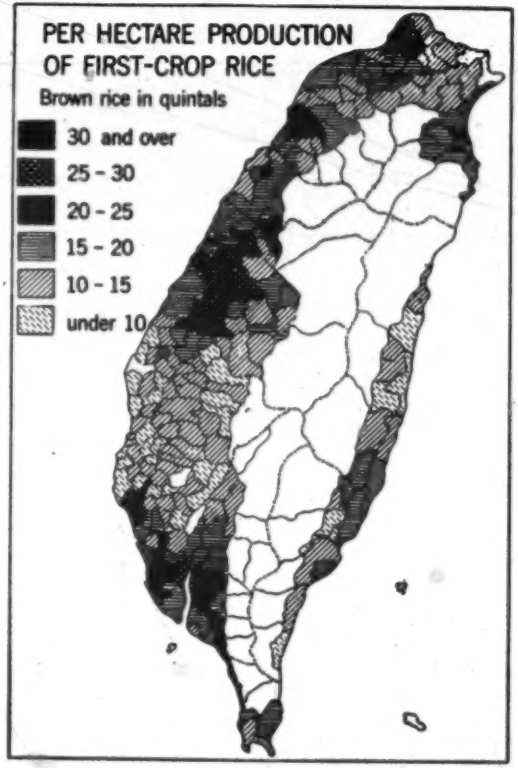

PER HECTARE PRODUCTION
OF FIRST-CROP RICE
Brown rice in quintals
30 and over
25 - 30
20 - 25
15 - 20
10 - 15
under 10

FIG. 19

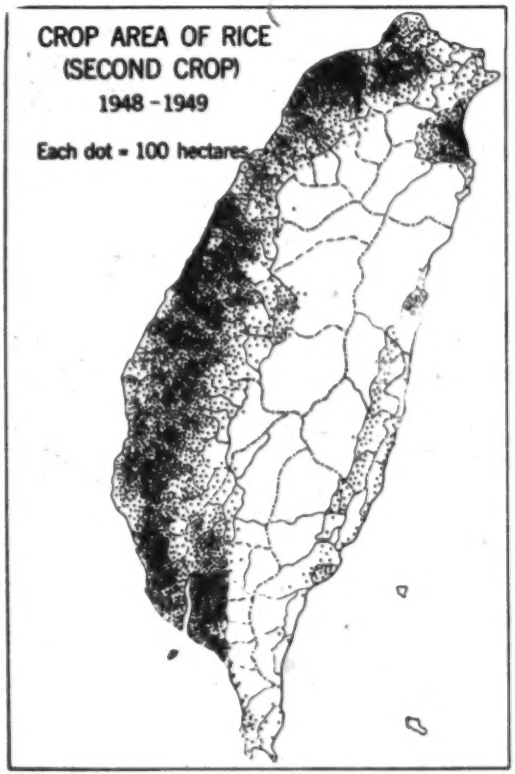

CROP AREA OF RICE
(SECOND CROP)
1948 - 1949
Each dot = 100 hectares

FIG. 20

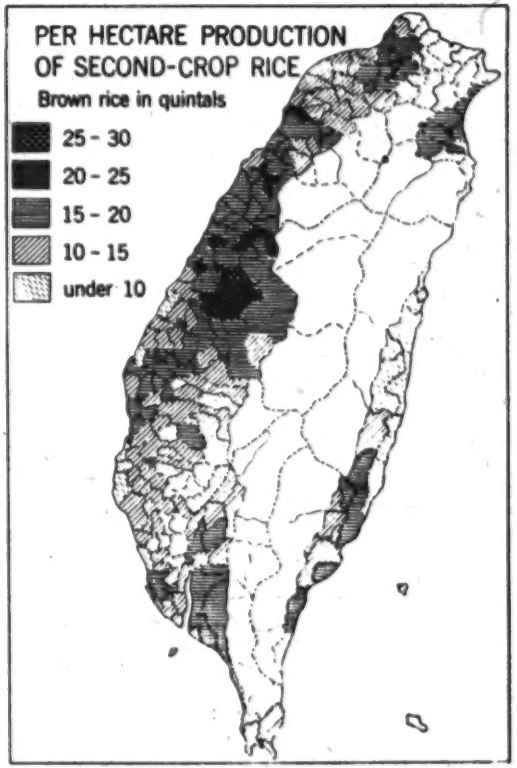

PER HECTARE PRODUCTION
OF SECOND-CROP RICE
Brown rice in quintals
25 - 30
20 - 25
15 - 20
10 - 15
under 10

FIG. 21

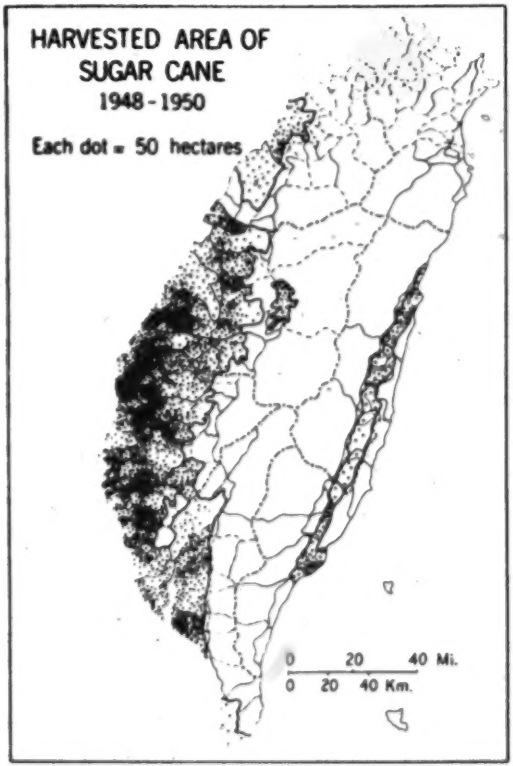

HARVESTED AREA OF
SUGAR CANE
1948-1950
Each dot = 50 hectares
0 20 40 Mi.
0 20 40 Km.

FIG. 22

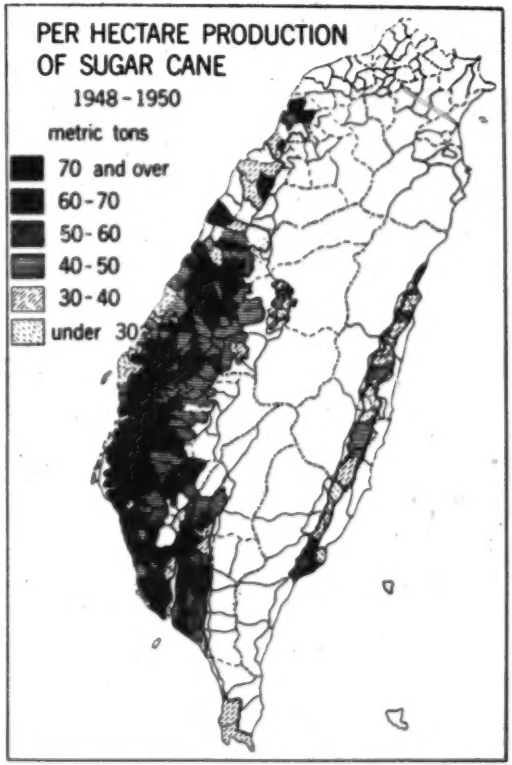

PER HECTARE PRODUCTION
OF SUGAR CANE
1948-1950
metric tons
70 and over
60-70
50-60
40-50
30-40
under 30

FIG. 23

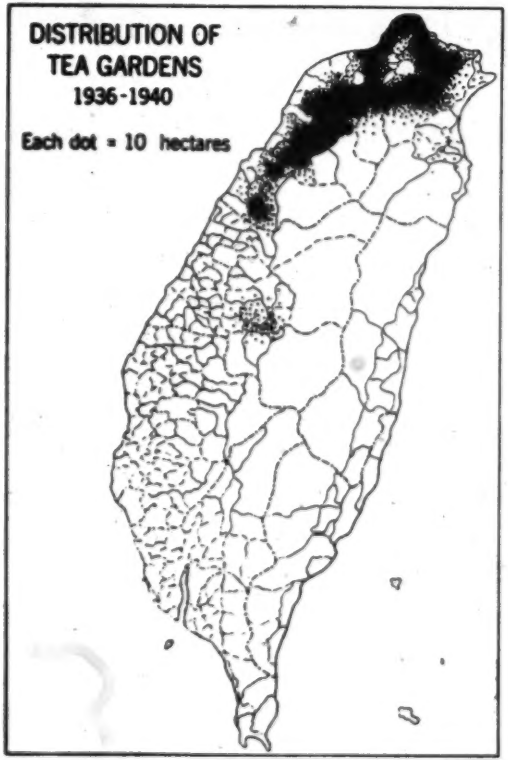

DISTRIBUTION OF
TEA GARDENS
1936-1940
Each dot = 10 hectares

FIG. 24

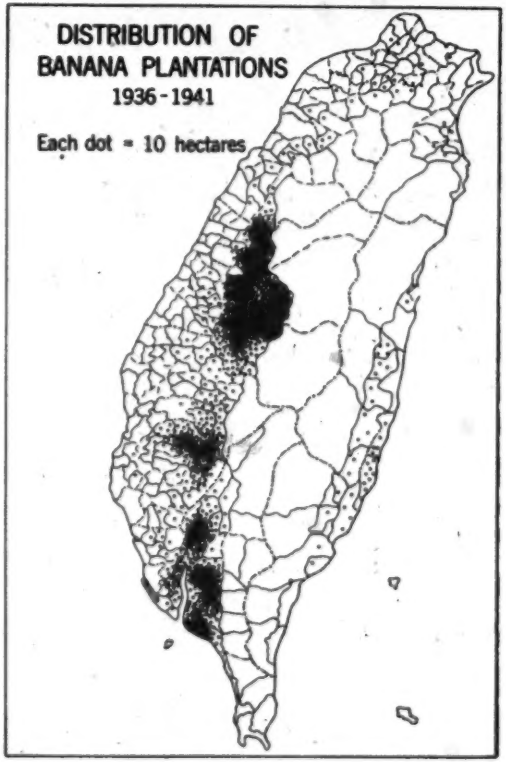

DISTRIBUTION OF
BANANA PLANTATIONS
1936-1941
Each dot = 10 hectares

FIG. 25

8: Chen--452
116, 245, 311

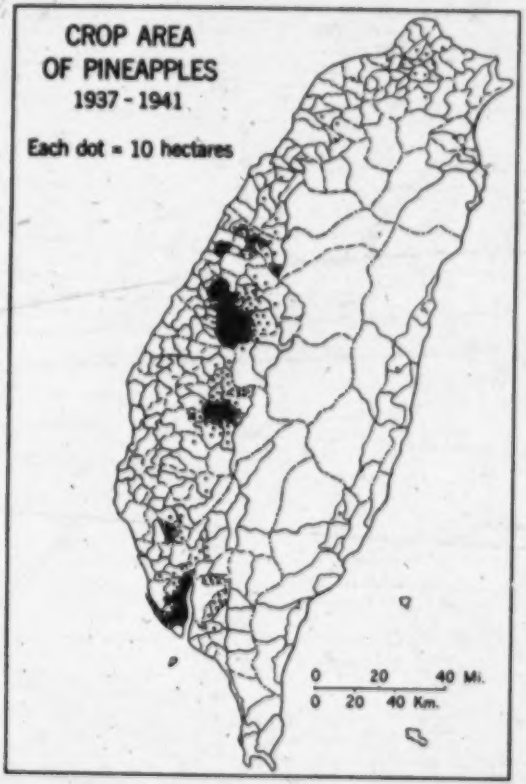


FIG. 26

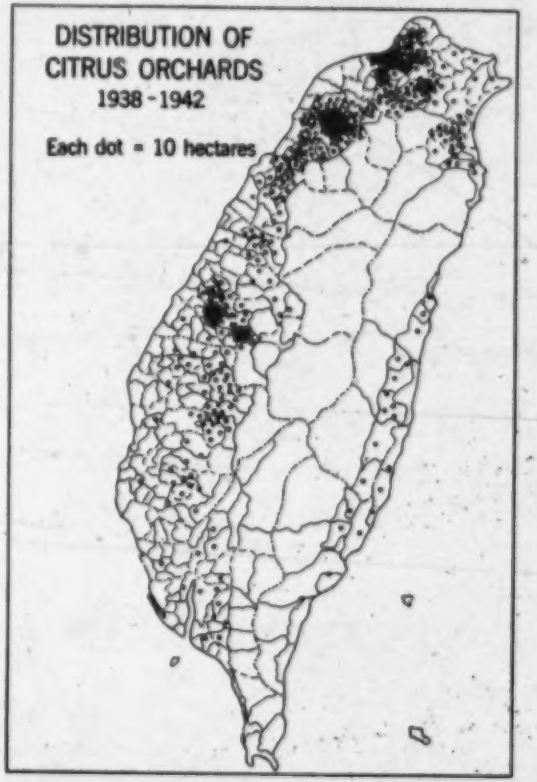


FIG. 27

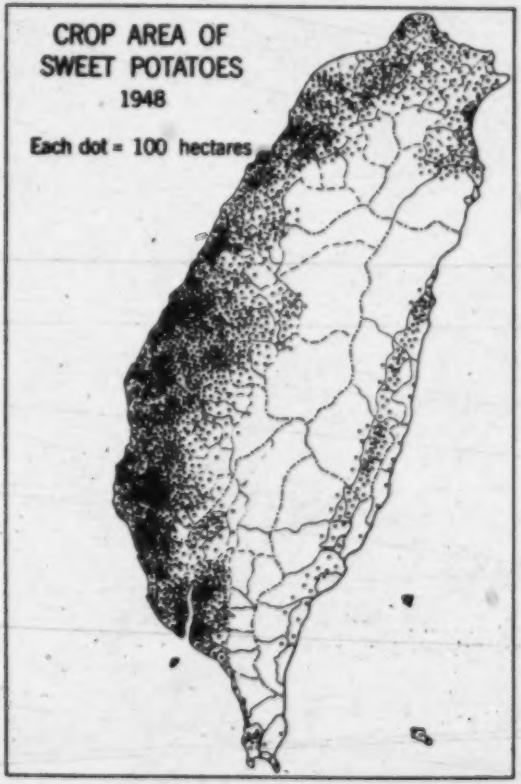

CROP AREA OF
SWEET POTATOES
1948
Each dot = 100 hectares

FIG. 28

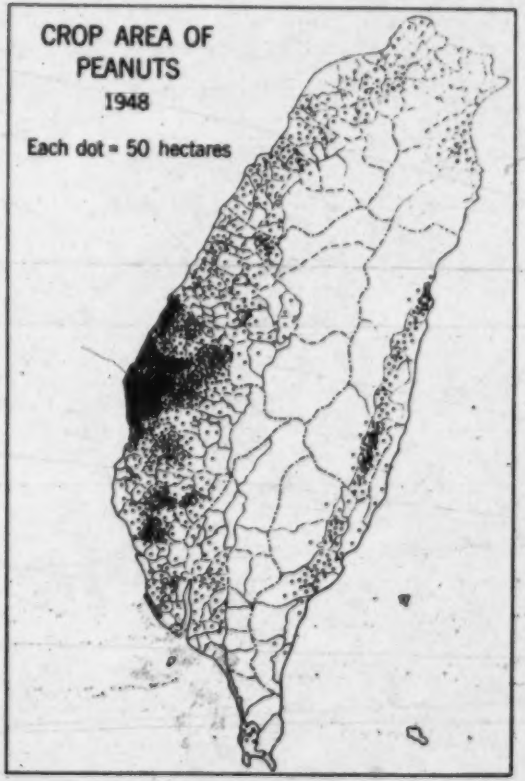

CROP AREA OF
PEANUTS
1948
Each dot = 50 hectares

FIG. 29

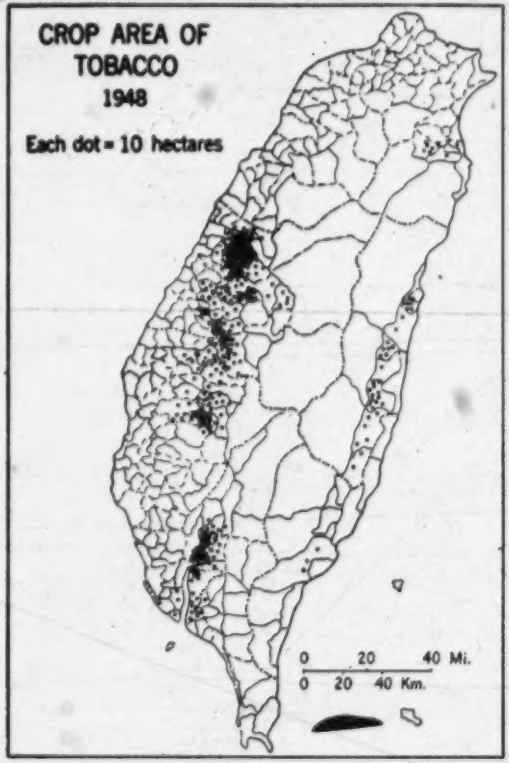

CROP AREA OF
TOBACCO
1948
Each dot = 10 hectares
0 20 40 Mi.
0 20 40 Km.

FIG. 30

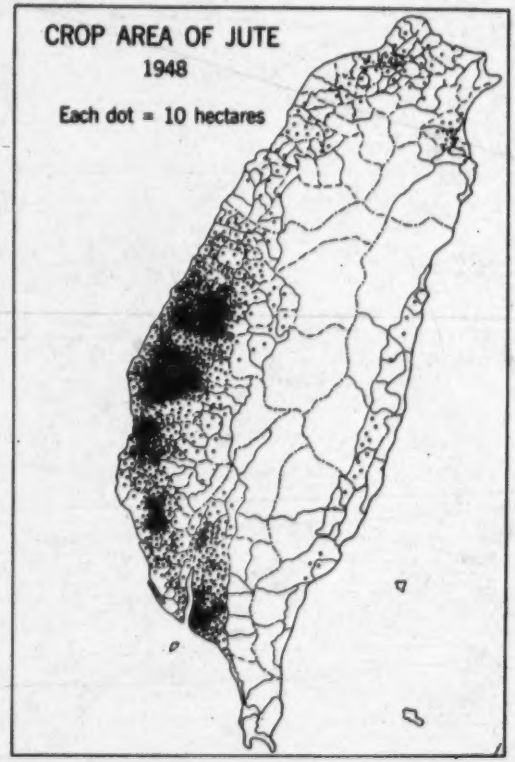

CROP AREA OF JUTE
1948
Each dot = 10 hectares

FIG. 31

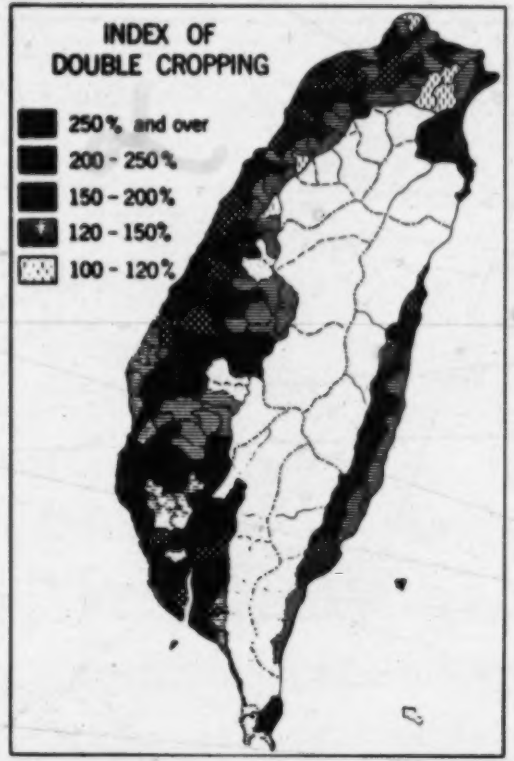

INDEX OF
DOUBLE CROPPING
250% and over
200 - 250%
150 - 200%
120 - 150%
100 - 120%

FIG. 32

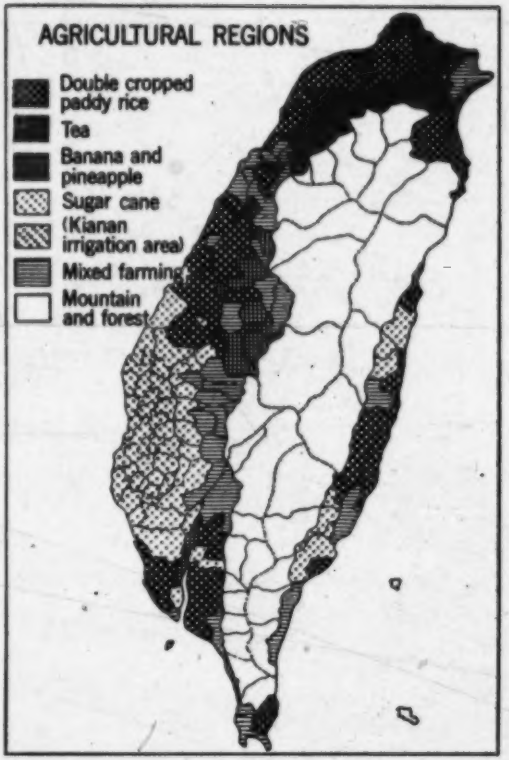

AGRICULTURAL REGIONS
Double cropped paddy rice
Tea
Banana and pineapple
Sugar cane
(Kianan irrigation area)
Mixed farming
Mountain and forest

FIG. 33

9: Yamasaki--231-232 N-5 (1896-1897) 1900 Formosans
116, 243, 311

The most important species of cereal on the island is rice (Orysa sativa L.). In the plains as on [232] the gentle slopes of the hilly regions, the rice fields occupy a great area. The basins of the two Tamsui Rivers, the Kapsiulan Plain near Giran, and the Taichū Plain are its chief centers. In East Taiwan we also find small rice plantations, as far as Chinese colonists have penetrated. There are usually two harvests a year: in South Taiwan even three harvests are obtained from the same fields.

9: Yamasaki--232 [2] N-5 (1896-1897) 1900 Formosans
116, 245, 311

While we have seen sugar in South Taiwan, we find many fields with tea plants in the northern part of the island. The surroundings of the Taihoku Basin yield most of this third most important island product. Tōshien Tableland and the two slopes of the Kilung Valley are covered in the main with these beautiful tea plantations. There are two kinds of Taiwan tea on the market, Oolong tea and Pauchong tea. They come from the same plants, the difference depending on the method of preparation. Oolong tea, which is usually made from the better leaves, is rather weaker in taste and odor than ordinary black tea, while the other is made aromatic by mixing it with flowers, such as jasmine (Matsuri). The leaves of the tea plant are harvested seven or eight times a year; but the best quality is obtained only from the second Spring harvest.

9: Yamasaki--232 [4] N-5 (1896-1897) 1900 Formosans
116, 244, 311

Sweet potatoes (Ipomea batatas Lam.) are one of the inhabitants' most important articles of diet for both the Chinese and the natives, and they are to be found growing on the island, wherever it is inhabited. In the mountain regions, as in Musha on the Dakusui-kei, which is inhabited by the wild aborigines, I have also seen fields of sweet potatoes on the rather steep slopes. There is also a double harvest in the western plain.

In the north of Formosa are cultivated a variety of products. The region from Kelung to Tamsui is the section that has most definitely been under the influence of Europeans because it is close to the port of Tamsui and the main settlement of the Europeans in Tuatutia. Here in the north all available land is utilized. The industrious people have even turned slopes into productive agricultural land. Yet only rice is cultivated on a large scale although there are indications that at one time in the past other less common products must have been grown. During war time [MC: 1895?] the sugar-cane fields were furrowed and ruined and the tea plantations were neglected. The land as far as Gosche is mainly used for fields of indigo and sweet potatoes; batatas and rice are rare. The region as far as Tschanghua, on the other hand, [223] is claimed almost exclusively by rice culture. It has escaped the destructive instinct of the Japanese because the Japanese troops wear straw sandals on their marches and would have dirtied their feet with mud and walked them sore on the irrigated rice fields; this would have been a definite impediment although it would not actually have been a danger. Economically the most valuable and the most beautiful part of Formosa extends from Tschang-hua to about 20 kilometers beyond Kia-y. The palm groves are rather clear in some sections and here one finds many remnants of protective shelters against the tropical sun where formerly the most precious products were cultivated. Here and there palm groves are lacking. It seems that for the last ten years the Chinese in these districts have confined themselves to a cultivation of rice or sugar-cane, because they required less capital and less

labor. In view of the political uncertainty and the greed of the mandarins it did not seem advisable to invest large sums for the cultivation of plants of the optimum state.

12: Garnot--13 G-3 (1884-85) 1894 Formosans
116, 133, 311

While the region near Kelung is very hilly, covered with trees and quite sparsely settled the section around Tamsui is quite different. Red dunes that are overgrown with bushes slope gently down toward the sea and the last mountain spurs give space to large low plains, which are fertilized by the alluvial deposits carried by a number of streams. These broad deep rivers run from one large city to the next and they are dotted with a good many boats. You see fine rice and sugar-cane plantations all through this area.

15: U.S. Navy--28 [12] (no date) 1944 Formosans
116, 312, 361, 311

"Availability of water supply (less favorable in the south) has also helped determine these settlement types. The fairly even distribution of rainfall throughout the year in the north makes springs and wells more constant and obviates the necessity of building near a permanent pool or deep stream. The method of land reclamation had an effect, too. Early militia, stationed in compact settlements, guarded the colonizers during the Koxinga period (early 17th century), and the soldiers themselves spent considerable time cultivating the land. The northern lowland districts, however, were developed in later years by private enterprise rather than by government policy. Ambitious land operators undertook to secure and clear areas unclaimed by the government. In turn, they subsidized tenants whom they brought in from the south, settling them on good land and building farmhouses for them."

Fortunately the Chinese have not yet deeply penetrated into the mountain regions, for they certainly do not know any such thing as consideration of the forest. Wherever they go war is made on the forest with fire. The Chinese inhabit bare plains where nothing but bamboo groves are visible; they are planted close to the dwellings. Incalculable damage has already been done by barbaric devastation.

31: Hofmann--604 [2] N-3 (1909) 1912 Formosans
116, 133, 231, 241, 311, 342

We travelled from Taihoku by train for 1 1/2 hours until we came to the small village of Toyen. Here the land is almost level and has been utilized to the fullest extent. The extensive rice plantations were green and threw into relief the picturesque houses of the Chinese; these are solid brick houses with a curved roof reminiscent of Buddhist temples. In the canals, for which the tributaries of the Tamsui are utilized, there are numerous tame ducks. In the small ponds one may see grey water buffalo, a domestic animal which occurs in large numbers of Formosa. It cannot be compared to European cattle as regards its usefulness in agriculture, and so far attempts to domesticate it have not been successful. Many times I saw the patient Chinese peasants threatened by the buffalo or saw that the animal had broken loose. Next to the rice fields there are extensive tea plantations. This is the region where the famous Oolong tea is produced. There are also banana and pineapple plantations on a smaller scale. The houses are surrounded by slender bamboo trees, and everywhere one may see betel palms, a tree which grows everywhere on Formosa.

From Toyen we travelled for 14 kilometers on a small vehicle on tracks (52 centimeter gauge); two Chinese coolies served to propel the car. We stopped at the steep bank of the Tamsui; the river rages far below, washing over the reddish-brown, muddy banks veined with large, round rocks. The rest of the way we went on foot or were carried in a sedan; the coolies were strong enough to carry these anywhere, always at the same regular pace. Every foot of land here has been utilized. Here and there we saw Acacia catechu trees; the sweet smell of their small, fragrant blossoms penetrated everywhere. The acacia, a small tree barely 10 meters high, is also important for tanning; this tree predominates in the plains of northern Formosa. Towards evening we came to Taikokan. (1) Our chief objection on this journey was to study the camphor production

1. The spelling of place names is based on the Japanese pronounciation; the Chinese use a somewhat different system of names.

of the Japanese Mitsui Company. The company had obtained a concession in the forested regions bordering on the territory of the aborigines. We did not succeed in this at first, since the region around Taikokan is a Chinese agricultural district.

31: Hofmann--612-613 N-3 (1909) 1912 Formosans
116, 137, 311, 499, 563, 177.31 Japanese
636.31

The pigtail which to us symbolizes Chinese traditions, in the cities exerts its rule in the literal as well as the figurative sense, it is a rule which cannot be stamped out. Chinese and Japanese are separated from each other by a difference in culture and beliefs which cannot be reconciled with each other. On the whole the Chinese element predominates and numerically they are so far superior that an amalgamation between the rulers and the subjects in the near future seems out of the question. The Japanese farmers, merchants, and small business men cannot compete with the Chinese; the Chinese are an astute people and they are moreover, better adapted to the [613] climatic conditions on this island. This is another motive for the Japanese to exploit the interior and to penetrate still further into the regions of the aborigines; here they plan to set up business enterprises on a large scale, but for this again they must use cheap Chinese labor. One of these enterprises is the construction of a railroad in the mountains so that the large forested regions in the vicinity of the Niitakayama (cf. Fig. 2, Mount Morrison) may be exploited. The forests are called the Arisan Forest; they have played an important role in Japanese politics during the last few years. The Fujita Company had acquired a concession for timber here; the government had to buy this land again from the company, which had already begun to build a railway, so that the price which had to be payed in all amounted to about two million yen, a sum which had to be granted by the Japanese Diet.

31: Hofmann--627 [3] N-3 (1909) 1912 Formosans
116, 311

After a short stay in Kagi we proceeded to the south by train. A few kilometers to the south we saw the pillar which marks the point where the railway cuts across the Tropic of Cancer. Our journey proceeded without interruptions to the end station in the south, Takao, the harbor city. On the whole the vegetation here is not so copious as in the north; this is due, of course, to differences in the climate and the frequency of rainfalls. Here, too, most of the soil which is fit for cultivation has been used for rice plantations; instead of tea plantations, however, there are fields of sugar cane here and there.

31: Hofmann--627-628 N-3 (1909) 1912 Formosans
116, 132, 311, 249

The sugar industry on Formosa has increased considerably; this industry will become [628] still more profitable when the projected plan for a system of irrigation with artificial dams has become a reality. In this way the tributary of the southern Tamsui may be utilized and more soil than hitherto will be irrigated. Southern Formosa is affected by the drought every winter.

31: Hofmann--629 N-3 (1909) 1912 Formosans
116, 249, 311

From the coast I went to Ako and visited the extensive sugar plantations there. These are run with modern equipment on a large scale; there are large factories and there is a great deal of activity. Aside from these plantations, however, the land around here has not been exploited to the fullest possible extent.

37: Steere--316 [2] S-3 (1873-74?) 1875 Formosans
116, 132, 311, 241

"The southern part of the island is in the tropics. There is much rain in the north part of the island, especially at Kelung. At Takao and Taiwanfu, it is dry from October to April, but it rains much sooner in the mountains to the east, the rains already beginning there in February. Rice is the principal crop cultivated upon the low level lands to the west, and there is much exported to China. The best lands produce three crops annually. Lands that are harder to irrigate are planted to sugar cane, and large quantities of sugar are exported in foreign vessels to Japan and Australia. Upon the first of March ten or twelve vessels were lying at the ports of Takao and Taiwanfu, all loading with sugar."

37: Steere--316-317 S-3 (1873-74?) 1875 Formosans
116, 245, 311, 314

"The culture of tea has but just commenced, but has already reached considerable importance at Tamsni. The kind mostly cultivated is Oolong, which goes most of it to the United States. The cultivation can be carried to any [317] extent in the north of the island, as there are great plains of high rolling lands lying from Changwha to Tamsni, of the rich red clay which is so favorable for tea. These high plains are the home of the camphor tree, many trunks and stumps of which still lie over the ground, and of the wild tea-tree, of which I saw one specimen, with the trunk a foot in diameter and thirty feet high. The inhabitants gather the wild tea, but it is of bad quality, either by nature or from being badly cured. These high plains are now lying desert, as they cannot be irrigated, while tea is one of the few plants that needs no irrigation. These lands lie near the sea where transportation is easy, while much, or most, of the Chinese tea country is almost inaccessible, the tea having to be carried many days on men's backs and then transported by boats down rapid and dangerous streams, before it can reach a market. Camphor is exported from the island, and most of the mountain land seems to have camphor upon it, but the drug is only procured by the destruction of the tree, and there is no replanting done. There is also quite a trade with China in camphor planks."

37: Steere--318 S-3 (1873-74?) 1875 Formosans
116, 131, 311, 161, 563, 157

"The Pescadores are a group of low flat islands between Formosa and the mainland. They seem to be composed almost entirely of basaltic rock, which is partly columnar in many of the cliffs. There is iron ore found upon Fisher's island. The rock of the island is barely covered with soil, but nearly their whole surface is cultivated during the south-west monsoon, in sweet potatoes, pea-nuts, and millet. The inhabitants are estimated at eighty thousand, and there are said to be thirty towns and villages. The town of Makang, which is the largest, probably has twelve or fifteen thousand inhabitants. Its harbor is good, but the entrance is intricate. The Chinese live generally in houses made of coral rock that is frequently cut into blocks. They are descendants of the Fuh-kienese, and are all fishermen. They have considerable trade with the mainland and with Formosa in dried fish and in hogs, which are fattened upon pea-nuts, and in pea-nut oil. The feet of all the women are small, though their hard and laborious life must make this custom troublesome enough. I saw one small-footed woman ploughing and driving the buffalo, though the wind was blowing a gale at the time, so that we could hardly stand before it. The islanders are a rough and uncivilized race, accustomed to hardships, and the charges of piracy and wrecking made against them, are, without doubt, true. They are the boldest of fisherman, and during the warm monsoon, are almost amphibious. I was there in January, when the weather was cold and the wind and sea high, but when they found that I wished coral and shells, they procured me large quantities living. The islands make a good place for shelter for Chinese junks

42: Schetelig--389 T-2 (no date) 1868 Formosans-1-2
116, 311, 361, 487

Starting from Manka, the point common to the three chief arms of the Tamsui River, I undertook a second expedition up the middle river to the interior. Chintamki, i.e., "the way to the indigo fields," is a small locality at the bend of this river arm where the river changes its southwesterly course for a north-northeasterly one. Up to this point the boats are forced through the rapids at the cost of some exertion, but then the river must be abandoned and the march to the interior must be undertaken on the roughest mountain paths, close to precipices and with the constant danger of plunging into the depths, into the swirling streams below. The traveler is richly compensated for all his labors and his dangerous slips by a delightful journey through the most remote cultural areas of Chinese colonization. On the highest mountain passes, at 2,000 feet and more, year in and year out the camphor trees and tree ferns are uprooted and, untiringly, Convulvulus edulis, the sweet potato, and the profitable indigo are planted; and although every summer terrific downfalls wash away the delicate plants from the very steep cliff walls, the industrious Chinese is not discouraged by the necessity of repeating his work.... It is clear at the first glance that there, along the upper course of the Tamsui River, the world of the primeval forest and the former haunts of the natives are disappearing more and more beneath the axe of the woodcutter. People who took the same path 5 or 6 years ago, in order to investigate the interior, still found primeval forest and natives living their undisturbed and unchanged lives in places where today

there are flourishing Chinese villages. The valley in which lies the village of Takau (this should not be confused with the port of the same name in the district of Fung-schan on the southwest coast), the terminus for our bearers and our assembly point, seems to have been taken in hand during the last few years only, for everywhere charred tree stumps may still be seen between the indigo plants. This valley is reached via a pass more than 2,000 feet high, and one is surprised by the sight of the upper course of the river tumbling and winding in the depths below, and also by the view of the mountain chains, uncountable as they stretch out to the south. Our aim was soon reached, namely to determine the situation of this upper valley and to survey and to measure the mountain ranges round about.

42: Schetelig--392 T-2 (no date) 1868 Formosans
116, 133, 311

The following brief remarks will be made concerning the distribution of heights and plains in the north of Formosa. I have shown that within one day it is possible, from the meeting point of the three chief streams in the Manka Plain, to reach the foot of the mountains in almost every direction. A further day's journey brings one right into the mountains, but generally one is still within the frontiers where Chinese colonists are to be found, and then, after crossing the first and second ridges, one enters the primeval forests. If one considers that, from our observation point near Takau in the middle of the northernmost third of the island and on the upper course of the Tamsui River, 400 feet above sea level, the nearest ranges are 200 to 300 feet high, that from there in a southerly direction mountains up to 5,000 feet high were measured by us and, finally, that the central connecting point of the Central Range, formerly thought to be 12,000 feet, is now known to be more than 13,000 feet with the surveying of Mount Sylvia, and that this highest point on the island is only 2 to 3 miles to the south; considering all this, it becomes clear that everything lying in between must be mountainous, and steep at that, with no tablelands or cultivated plateaus. Yet all the land lying to the north of the lower course of the middle stream, , or that which is situated round the Kilung River, is of surprising fertility, as is also the already mentioned Manka Plain which, strangely enough, is irrigated not by the Tamsui River itself but by one of those admirable Chinese artificial systems of irrigation that brings the water from distant mountains.

161 They have come from various provinces on the Mainland and are composed of government employees, professionals, and technical personnel.

III. PATTERN OF SETTLEMENT AND DENSITY

• 311 In the early days of settlement, Chinese immigrants first cultivated the fertile land and plains of the coastal areas from which the aborigines had been driven. The inhospitable and inaccessible nature of the mountains protected the aborigines from continued exploitation but also served to contain them.

About ninety per cent of the total population now occupies the coastal lowlands; the remainder, among them the aborigines, is scattered over the central mountain area which comprises two-thirds of the island's total area. The people from Kwangtung, arriving later than the people from Fukien, settled in the foothills and cultivated rice terraces. The Fukienese inhabit most of the lowland and urban areas.

161 The average density of the population is 610 persons per square mile.[3] However, 2,500 persons must share the amount of food produced on one square mile of cultivated land (nutrition density).

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3. Statistical Abstract of the Republic of China, Executive Yuan, Directorate-General of Budgets, Accounts and Statistics, Taipei, 1955, p. 28.

45:Stanford U. S-4, 5 1956 AD1 Formosa
~~AD1~~ AD1

II. ARABLE LAND

433
311 The amount of arable land available for agricultural production was more than doubled during the period of Japanese rule. With improved production techniques and methods of irrigation, there was a twentyfold increase in sugar cane, a fourfold increase in sweet potatoes, and a threefold increase in rice production. The production of pineapple increased over a hundred times.

By 1936, Japan turned its efforts toward the development of industry on Formosa. This was due, in part, to wartime needs as well as to the fact that the development of available arable land had reached its limit. Yet agricultural production under the Japanese set a record that required more than five years' effort after World War II to surpass.

Today, it is generally believed that Formosa has exhausted the possibilities of its arable land. However, if better fertilizer, improved seed, new farming techniques, and adequate pest control are introduced, it

[433] 311 would seem possible for the island to produce more food to meet the needs of an increasing population. It is also possible that irrigation projects, now in the planning stage or but recently begun, may increase the amount of irrigated land available.

Table 2. Cultivated Land*
(1,000 hectares)

	Paddy Fields	Others	Total
1945	504.7	311.3	816.0
1949	528.1	336.8	864.9
1953	533.3	339.4	872.7

* Taiwan Provincial Government, Taiwan Agricultural Yearbook, 1954, Taipei, 1954, p. 20.

Steep and rugged mountains cover the major portion of Formosa. The island's total land area has been estimated at 3,596,000 hectares, of which only 24 per cent is considered suitable for agricultural purposes. For the past eighteen years, the

• 311 total arable land has remained more or less constant, in spite of the fact that some land along the eastern coast of the island as well as some 300,000 hectares of grass land in the mountains might be developed either for crops or as grazing land if the expense of such projects did not seem to indicate that the cost would be prohibitive.[4] When the [53] Shihmen dam and reservoir project is completed, waste land on the banks of Tanshui River can be converted into paddy fields. It is believed that the completion of the dam will make possible the reclamation of at least 54,000 hectares.[5]

241 Paddy fields constitute about 60 per cent of the total cultivated land in Formosa. They are classified in two categories -- double-cropping fields and single-cropping fields. The former yields two crops of rice each year. Between rice crops, one crop of vegetables is planted and harvested. In single-cropping fields, besides one crop of

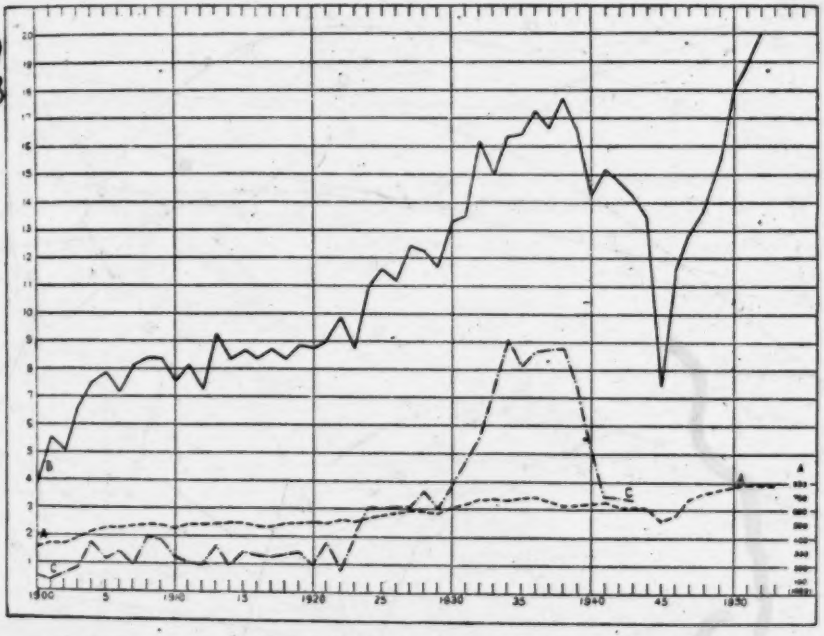
4. Table 196, "Summary of Statistics of Taiwan for the Past Fifty-one Years," Taiwan Agricultural Yearbook, 1954, p. 20.

5. Chung-yang Jih-pao [The Central Daily News], Taipei, July 1, 1955.

48: Chen E-4 (no date) 1955 AD1 Formosa AD1

Productivity was raised by improvements in various aspects. The rapid increase in the output of rice from the 1920's was the result of the adoption of a new strain (Ponlai rice). By the 1930's, the production of rice in Taiwan was so large as to be twice its local demand, and the surplus rice was exported to Japan. Though the price of Taiwan rice was controlled by the Japanese government and the profit of trade in rice was mainly monopolized by big Japanese traders, the increase of production did have some benefits for Taiwanese, and no doubt, this contributed to the lowering of the death rate after 1920.

Fig. 6 Acreage of Cultivation, Amount of Production and Exportation of Rice, Taiwan, 1900-1953



A: Acreage of Cultivation (unit: 1,000 ha) B: Amount of Production (unit: 1,000,000 hectoliter)
C: Amount of Net Export (unit: 1,000,000 hectoliter)
Source, 1900-1948, from the Rice of Taiwan, 1949, Taipei.
1949-1952, from Taiwan Agricultural Yearbook, 1952, Taipei.

The condition of sugar was a little different from that of rice. The profit in sugar manufacturing was exclusively monopolized by the Japanese enterprisers. But it is undeniable that, in respect to the improvement of agricultural techniques and the raising of productivity, substantial effects were obtained.

As pointed out by W.S. Thompson, "underfeeding weakens the individual and renders him less resistant to disease, whether it be of the degenerative or of the germ

52:Barclay S-5 (nodate)1954 AD1 Formosa AD1

TABLE 6

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IMPROVEMENT IN THE YIELDS OF RICE IN TAIWAN, 1916 TO 1945

Average Yields of Different Strains in Each Year,
First and Second Crops Combined
(Hectoliters of Rice per Hectare)*

Years	*All Rice*	*Horai Rice*	*Other Strains*	*Per Cent of Rice Land Devoted to Horai*
1916-20	17.8	—	20.1	—
1921-25	19.3	28.5	19.3	4.6
1926-30	20.9	22.7	20.4	19.9
1931-35	23.0	27.2	21.3	33.7
1936-40	25.5	28.2	23.2	47.3
1941-45	21.6	22.7	19.7	59.8

* Crop statistics in Taiwan were not kept in metric units. Figures in the *Statistical Summary of Taiwan* were all converted before publication.
Source: *Statistical Summary*, Table 203.

•311
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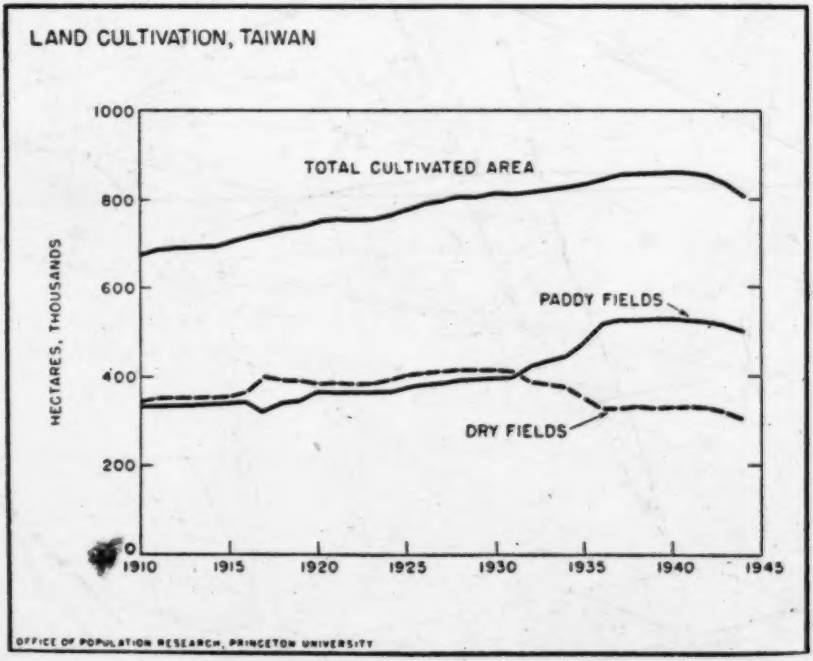

Fig. 5. Area of Cultivated Land, Taiwan, 1910-1944.

52:Barclay S-5 (nodate)1954 AD1 Formosa AD1

ments, health program, and construction for public works all depended on generous amounts of labor. Without such cheap incentives to mobilize this labor, these projects could not have been pursued so effectively.

As obvious as these advantages of "indirect rule" may be, it should be as clear that it is a poor vehicle for introducing social change. The more it is used to wield authority, the stronger and more resistant to change it can become; the more it is undermined by altering local relationships that sustain it, the less remains of its usefulness. Hence, from adoption of this scheme initially as an expedient to "pacify" the island, Japanese authorities acquired a positive interest in preserving the same set of agrarian institutions that had existed in Taiwan before their arrival.

Thus they abandoned the idea of reorganizing the rural society—primarily because they tried and failed, but also because as it stood it gave them the best access to regulation of the agricultural population and farming practices. It was in some respects a ready-made instrument for exerting the necessary control with the least disturbance of customary affairs, having in the past enabled the various parties to the export trade to prosper at the expense of farmers. For better coordination of their policies, Japanese gradually did erect a more formal type of government administration, but the basis of the system in rural areas was not greatly affected by this modification.

The Impact of Improvements in Agriculture

The Japanese who were charged with remodeling Taiwan's economy gave first priority to long-range investments around the fringes of agriculture. The rural economy was already geared to exchange food and related products for special capital services. Certain of these services were soon altered under Japanese influence. Positions that provided them, or that could usurp them, gradually began to be occupied by Japanese nationals—official, private, and always an indistinct class in between that wielded quasi-official sanctions.

Those innovations that worked their way into agriculture were directed chiefly to raising crop yields per unit of tilled land. Another avenue of increasing the total agricultural product was by extending

construed as a lament that there were few opportunities for advancement outside the rural villages and towns dominated by petty gentry. Discontent from this source bore few signs of being the awakening of a popular movement for independence among the Taiwanese, as it is sometimes represented. See Hsü Tze-wei (1946), p. 161 ff.

52:Barclay S-5 (nodate)1954 ADl Formosa ADl

the land area that yielded crops. From 34.2 per cent of all "level" land (under 500 meters elevation) in 1910, this area cultivated was raised to 43.7 per cent by 1940. The *effective* crop area was extended still further by irrigation, terracing and careful crop rotation. Irrigation converted many dry fields into paddy fields, as we found in the previous chapter. Improvement in irrigation made more of the paddy fields yield two or more crops each year (see Table 9). Evidently

TABLE 9

SPREAD OF DOUBLE-CROPPING IN IRRIGATED FIELDS, 1917 TO 1945

Area of Paddy Fields That Was Double-Cropped in Taiwan

(Thousands of Hectares)

Yearly Average in Each Period

Years	Total Cultivated Area	Area in Paddy Fields	Area of Double-Cropped Paddy Fields	Per Cent Double-Cropped: of Total Cultivated Area	Per Cent Double-Cropped: of Total Paddy Area
1917-1919	730	336	217	29.7	64.5
1920-1924	753	366	252	33.4	68.7
1925-1929	795	386	274	34.4	71.0
1930-1934	816	422	300	36.8	71.2
1935-1939	850	516	320	37.6	61.9
1940-1944	844	520	314	37.2	60.4

Sources: *Statistical Summary*, Table 196.
Ch'en Cheng-hsiang, *Land Utilization in Taiwan*, Appendix, Table 2.

much of the advance in crop production took the form of increasing the number of harvests from land already cultivated, which in Taiwan was already the "highest in the [Japanese] Empire."[14]

Land was not the only element of agriculture that was put to harder use. With a few exceptions,[15] cultivation continued to be carried on with little difference in ways of applying human labor to the land. Agricultural implements were improved, but remained similar in design; irrigation facilities opened new land, but their construction was itself labor-intensive; transplanting of rice became generally practised to save land, but it is inherently a very laborious process. One of the major problems of farmers in the Far East has long been that their work is distributed unevenly throughout the

[14] Nasu, Shiroshi (1941), p. 96.

[15] A few large-scale plantations experimented with the use of tractors in raising sugar cane.

1:Gallin E-4,5 (1957-1958) 1966
AD5 Taiwan Hokkien AD5
Formosa AD1

[2

The Setting

T 128 In any community study there is always the question of where to begin outlining the picture of village life: on what does one focus first? While the question is perhaps just as urgent during the actual fieldwork, in the field it is possible to observe and ask questions on many subjects at the same time and to move from one subject to another in the course of an interview. But in attempting to put the ethnography down on paper, the decision must be made where to begin.

I have chosen to begin this book as I began my fieldwork—with a general picture of village life that will provide a context which can give meaning to particular aspects of village life. This picture will be followed in Chapters 3 and 4 by a description of the village livelihood, although it has perhaps been more common to begin Chinese ethnographies with a discussion of family and kinship (here Chapters 5 and 6). The importance of the economic sphere in Hsin Hsing is explicit in the very purposes of this book as noted in Chapter 1 and the conclusions of Chapter 9; its importance was implicit throughout the fieldwork as it will be throughout this book. We now turn then to the setting of the village so that specific topical chapters which follow will have some contextual meaning.

T 131 F 497 Travel to Hsin Hsing village from the capital city, Taipei, is neither easy nor brief. The approximately one hundred and seventeen-mile trip to Chang-hua, the closest major city, must be made mostly by train via the seacoast or by the interior route through Taichung City. This takes about three hours by diesel express or six hours or more by a local train. It is generally possible to find a seat on the diesel express, but on the local trains one must almost always stand a good part of the way.

F • 311 F 499 175 648 Once out of Taipei the countryside is almost all rice paddies and farmland. Even in the mountain area between Taipei and Taichung, terraced rice paddies form a part of the green and lush vegetation typical of Taiwan. The train goes through a series of tunnels in these rugged mountains, and if one happens to be traveling with a Taiwanese companion, he will probably point out that these tunnels, like the railroad lines, were all built during the Japanese occupation.

1:Gallin E-4,5 (1957-1958) 1966
AD5 Taiwan Hokkien AD5
Formosa AD1

like the railroad lines, were all built during the Japanese occupation.

The mountain ranges serve as a kind of climatic divide. The area north of the mountains, which includes the Taipei region, is known for its long rainy season and cold raw winters. In the area south of the divide, and especially around Taichung and the interior mountain region, the weather tends to be milder, with far less rain and many days of bright sunshine.

On the trip south from Taipei to Chang-hua City the train crosses several large rivers which originate in the interior mountains and flow west to the Strait of Formosa. The rushing torrents of water during and immediately after the rainy season dwindle to a trickle during the dry season, meandering through wide, sandy, and rocky river beds.

At Chang-hua City the traveler must leave the train for a bus headed southwest to the old port city of Lukang. Although the buses leave every fifteen minutes during the day, they are invariably crowded with people and their bundles of produce, fish, a chicken or two, or even building materials.

The thirty-minute trip in an old wooden Japanese bus is made entirely on dirt roads. The ride may be dusty or wet according to the season, but it is always bumpy and noisy. In the dry season strangling dust pours into the bus from all sides. During the wet season, there is always a possibility that the passengers will have to leave the bus and wade while the bus creeps slowly along over the flooded roadbed. Many menthol-distilling factories, brickworks, and small rice mills line the way. The bus must cross many small irrigation canals and maneuver around oxcarts. As the bus moves further away from Chang-hua City and approaches the seacoast area of Lukang, a change in the agricultural landscape, resulting from differences in irrigation systems, becomes more and more noticeable. In those places where there is still no irrigation system, there are large areas of dry fields.

After a half-hour wait in Lukang, the traveler boards another, similar bus for the trip to the village, which lies about three miles inland or southeast of Lukang. The uncomfortable fifteen-minute ride ends when the bus comes to a halt in front of the Hsin Hsing village store.

The houses in the village are constructed of bamboo, mud or fired brick, and plaster. The foundations and structural uprights are usually brick; the walls are a latticework of bamboo strips, filled in with plaster which is a mixture of mud and cow dung. The plaster filling is usually whitewashed. Sometimes the main supports are not brick but heavy bamboo poles. Newer houses, and the older houses of the wealthy, generally have roofs of cement tile, while the oldest and poorest houses have thatched roofs. Houses made of mud bricks are always thatched.

1:Gallin E-4,5 (1957-1958) 1966
AD5 Taiwan Hokkien AD5
Formosa AD1 •

just north of the Tropic of Cancer—the winters of this coastal area, unlike the interior, are cold and raw while the summers are extremely hot and humid. Winter temperatures seldom fall below the middle forties, but icy winds frequently blow with almost gale force across from the mainland and the Strait of Formosa. Although the area itself never has snow, on a clear January or February day snow-capped peaks of the high interior mountains to the east can be seen from the village.

As in most of Asia, rain is seasonal. Between 80 and 85 percent of the annual rainfall comes during the late spring and summer months (April to September) (Chen, 1950:5).[1] During the heaviest rains and the late summer typhoon season, roads as well as paddy fields are often flooded. In this particular area, frequently the rain alone makes it possible to transplant the rice seedlings, for the irrigation water is often late in reaching the Hsin Hsing area, lying as it does so far from the mountain headwaters. With the passing of the rainy season the weather is relatively dry for the remainder of the year, and all crops depend almost entirely on water from the elaborate irrigation system.

For two decades or more this area has been able to harvest three crops annually. In the irrigated areas two crops of rice are grown; sometimes a vegetable or some other crop is substituted. The third dry crop is usually wheat or sweet potatoes. On dry land, two or possibly three crops a year are grown as well. Such intensive cultivation has been made possible through a favorable climate, irrigation facilities, and an increased availability of chemical fertilizer. It has also come about partially as a result of the population increase, which has provided additional labor to work the available land and to exploit previously undeveloped lands.

Although most of the original inhabitants from the mainland settled on the relatively fertile coastal plain where Hsin Hsing is located, the land resources could not be fully exploited because of their small number. Today, this situation is reversed, and in spite of large-scale irrigation, land scarcity makes it necessary for parts of expanding families, and even whole households, to move to urban centers to find work. Land scarcity in the whole Hsin Hsing area is so severe that even villagers who remain there must go outside the village to earn a livelihood for their families or to supplement the family income. Although the problem may be unusually acute in Hsin Hsing village and in some neighboring villages, it must nevertheless be recognized that it is characteristic of a large part of Taiwan. If the population of the rural areas of the island continues to grow at its present rate, the land scarcity which is now so severe in the Hsin Hsing area will undoubtedly become a major problem for the greater part of the Taiwan countryside.